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Unfortunately, we are no longer able to answer enquiries made by telephone. If you have any comments or difficulties, please write the The Editor, Open Channel, Trouble Shooter, or Psion Solutions. We will do our best to deal with your problem in the magazine, though we cannot guarantee individual replies.

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NEXT MONTH

DBQL

We continue with Tom Ashcroft's simple relational database.

GETTING THE PICTURE

CL Systems' QL Real Time Digitiser on test.

QL

SCENE

Keyboard 90 at EEC

EEC Ltd. has signed a contract with Jurgen Falkenberg's JFC Computer Technik in Germany for exclusive distribution rights to the QL-Keyboard-90 PC-style keyboard interface, reviewed in QL World February 1991 and followed up in the April issue.

As well as the interface, EEC are able to supply an Epson 102-key PS2 keyboard for around £100 or an 84-key AT layout AZERTY keyboard some £15 cheaper.

Normal fitting of the interface is internal via the socket occupied by the 8049 ic, which transfers onto the interface. No soldering is required. Expansions and other internally-fitted modifications may require rearrangement. Some custom-

ers may also difficulty fitting the interface internally in such a way that the existing keyboard can be used, if required. A modification kit is available for £15 which connects the interface externally by removing the 8049 chip from its socket and connecting a ribbon cable through the back of the QL to a small plastic box into which the interface is fitted. This method avoids disturbing the membrane connections and the timer crystal, which may otherwise be necessary depending on the motherboard issue.

Further details, including fitting information, from EEC Ltd., 18-21 Misbourne House, Chiltern Hill, Chalfont St. Peter, Bucks SL9 9UE. Tel. 0735 888866.

Happy Birthday

The New England Sinclair QL User Group has contacted *QL World* to announce its first anniversary in July 1991. The group, which began as a subgroup of the Boston Computer Society, has grown from 18 to 37 members, scattered across the USA as well as in Europe, since its inception. It publishes a bi-monthly newsletter and meets regularly, as well as holding demonstrations and workshops. Its special projects include a data acquisition and control board capable of handling up to 20,000 samples per second on up to four channels, and its own software library

including original, published and public domain programs.

They also display a pragmatic approach to electing committee members, which could be adopted more widely. We quote from a recent set of minutes:

"Since Sherm Waterman hadn't been able to make the meeting, he was elected Treasurer and Membership Secretary. Welcome Sherm!"

Annual membership dues are \$US 10 within North America and SUS 15 for the rest of the world (airmail). Contact NESQLUG at PO Box 8763, Boston, MA 02114 8763.

MS-QLink Update

Version 1.6 of MS-QLink is now being shipped. MS-QLink transfers files to and from MS-DOS (PC standard) disks. The new version includes an extended command reminder to make operation simpler. A new laser-printed manual is included. MS-QLink costs £12.

Discopy V2.07 now has a laser-printed manual, and costs £7.

The two programs can be purchased together for £17 the pair. For upgrades to the programs, including new manuals, existing owners should send the original disk and £1 per disk (by cheque payable to TF Leal).

Orders and enquiries to TF Leal, QFile, Apartado 2110, P-1103 Lisboa Codex, Portugal.

Qubbesoft in action

The QubbeSoft (*pronounced cube-soft*) PD public domain and shareware software library for the QL is now available on microcassette as well as 3.5in disk. Mdv's hold only three programs as opposed to disk's ten. Copying fees are 30p for mdv and 50p for disk. All QubbeSoft's media are menu-driven, and as a bonus each mdv contain a screen compression program which loads the main menu screen from the microcassette.

At the time of reporting, QubbeSoft is offering six public domain disks, one shareware disk and 16 public domain microcassettes. Their catalogue gives a brief description of the software on each medium, and information on how to obtain it. Send an A5 (booklet) sized stamped self-addressed envelope to:

QubbeSoft PD, 38 Brunwin Rd., Rayne, Braintree, Essex CM7 5BU.

Progs now in Wales

Progs of Belgium has contacted *QL World* to tell us that Dilwyn Jones Computing of Bangor is now selling their range of software, including *The Painter*, *The Painter XM*, *DataDesign*, *Qractal* and *The ClipArt*. Clients in Germany can contact Jochen Merz for more information.

FORMAT

The next London All Formats Computer Fair will be held at the **New Horticultural Halls, Greycoat Street, Westminster, London** on Saturday 18 May from 10am to 5pm. Admission is £3.

FAIR



OPEN CHANNEL

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide

somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, 116/120 Goswell Road, London EC1V 7QD.

ProPub

I came into desktop publishing through *Page Designer*, and I now have *Professional Publisher* and *Page Designer 2* as well. I have been using all three programs for about six months, and each program has integral features which I especially like for a particular job.

I often re-read articles on programs after I have been using them for a while to see if there are any finer points I am missing. I recently re-read Bryan Davies' articles on using *Professional Publisher* in the April and July 1990 editions of QLW. The overall impression from

the articles is of a program which is time-consuming and not all that easy to use. I have not found PP at all like this, indeed, it is easy to get to grips with and the results are excellent. In addition to the on-screen help, I also like the alphabetic section of the manual, which makes facilities and explanations easy to find.

With all the facilities which PP provides, it would be strange if one was able to use them all after only half-an-hour's familiarisation or so, especially when you consider that people go on courses of several days to learn how to use some word processor programs.

Even if one is conversant with

word processors, the concepts used by a desktop publisher are completely different, and inevitably one must allow oneself time to understand these different concepts. I found that I was able to produce good pages after a very short time with PP.

I have been pleased with PP, and have even been considering getting a scanner to use with it and *Page Designer 2*. If I wanted to produce a complicated picture for use on any dtp page, I would use a scanner rather than try to produce it by hand.

Peter Hamill
Elton
Peterborough

instrument interface (V1.00. 1985) from another user. Because the manual is incomplete, I tried writing to CST in Stevenage, Herts, but got the letter back with 'gone away' sign. Can you help me with a new address for Cambridge System Technology or Procyon Research Ltd., writers of the QL-488 manual. Or do you know someone who is using the QL-488 instrument interface? I would pay a reasonable price to get the missing manual pages: page 5.1 up to the end of chapter 5; 7.7, 7.8, 7.11, 7.12 and 7.23 up to the end of chapter 7. I would be very glad to have these pages for my extensive QL work.

Siegfried Paetzold
Norderstedt
Germany

Multidesk

I bought a QL Multi disk drive (version QL 273) in December 1987 from Sandy (UK) PCP Ltd., of Bedford. It was a very useful unit, with one 5.25in drive and one 3.5in one. Unfortunately, the 5.25in drive has become erratic and unreliable, I am told that the problem is in the internal interface, but it seems that Sandy no longer exist, and the only 'successor' I can trace does not support the QL Multi.

If somebody could help me trace some replacement parts, I would be most grateful. It seems a shame to throw away a useful and serviceable disk drive.

Roy Tuff
Town End Cottage
Ilam
Ashbourne
Derbyshire DE6 2AZ

Gone Away

I have bought a QL-488 GPIB

Editor's comment: if anybody writes to us with an offer of help, we will forward it to Siegfried.

Boot

May I remind you that the quickest way to add line numbers to a line-numberless boot file (QL world February 1991) is:

AUTO:LOAD flpl_boot

as a one-line command.

Stephen Meech
Maidstone
Kent

Friendly

The variety of material in *QL World* and the general air of enthusiasm are always welcome, as are those friendly editorial comments on readers' letters, and the very helpful direct replies from contributors such as Bryan Davies.

Editor's notebook

As hinted in a virtual *Stop Press!* last month, information on the new Miracle Systems Gold Card has at last surfaced. You will find it in *Trouble-shooter*, and in Simon Goodwin's report in *News Extra* on page 16.

Another virtual *Stop Press*: Ron Dunnet, now for his sins General Secretary of Quanta, rang to say that the Quanta workshop reported in this month's QL Scene has been changed to Sunday 9 June. We hope to incorporate this correction, but if we fail, this is a reminder.

Another piece of news from Quanta: Syd Humphries' name was omitted in error from the April Quanta post-AGM committee list. Syd is no longer Chairman, but he is an ordinary Committee Member. "Syd wanted to take a back seat, not fall off altogether", commented Ron.

Anything you don't see this month has probably been held over (again). The QL community has been writing like a community possessed since Christmas. Keep it up.

However, a little more thought about the difficulties is called for when a complex theme such as SG's experiences with his Thor (quite abstruse for anyone without personal knowledge of that machine) is printed. To underlay shadowy graphics as in the March issue is to compound the intellectual problems with unnecessary additional visual obstacles. That stricture also applies, on occasions, to your use of dark coloured pages. They may add to the attraction of the magazine from a distance, but can be very irritating to anyone who is merely trying to understand the words! Carry on QLing.

John Roberts
Littlehampton

Editor's friendly comment: Yes, unfortunately the graphics behind Valhalla Revisited printed rather darker than we expected.

Numeric

I see in February's QL World that Mark Smith asked how to ensure that input is numeric. I enclose a Basic solution

Rich Mellor
Sheffield
Walsall

Changed

I have several original programs which are now 'bad or changed medium', for example, *Pyramide Wanderer 3D*, *Leisure Genius Scrabble*, *Psion Chess*, which I believe are no longer available. I had no response to letters sent to the addresses. Is there any way I can get these replaced or repaired, rather than buying them again?

David Maw
Edgbaston
Birmingham

Editor's comment: Copying software from another person's master is a morally dubious practice, but where programs are genuinely unavailable, unsupported and no longer functioning, someone may be able to help, either with a plain backup or some hacking. Psion Chess is still sold by TK Computerware (0303 81 2801) so you should have a word with them. Do your microdrives need service-

ing? If you think so, have a word with TF Services (081 724 9053). Have you been using your master copy instead of a backup? If you have - you won't do it again, will you?

MS-DOS

I would like to express my interest in the decision of Miracle Systems to construct a 32-bit based hardware card (but based on the 68020 or the 68030?) to speed up the QL. If what I have heard is true, then presumably this card, in conjunction with *Conqueror* from DP, converts the QL into a very passable MS-DOS machine, which should help to prolong the QL's life, no matter what we think about MS-DOS! I would also like to see the increased performance include the possibility of high density disks and perhaps improvements on the graphics capabilities of the QL. One possibility would be to replace the ZX8302 and use the 128K standard memory for a very much enhanced graphics resolution.

James Gibson
Newbury
Berks

Judgement

I note from the March issue of your magazine that the Birmingham Consumer Protection Division lists 26 outstanding complaints against Mr Silk relating to losses incurred by your readers through unfulfilled orders. This would include my complaint relating to an order dating back to January 1990 for a Psion suite version 2.535/2.38 as advertised by PDQL.

You may be interested to know that I did pursue my case through the Small Claims Court and now have a County Court Judgement against Mr Silk. The amount involved is not large (£38 plus £7 costs), and I will not throw any money after it in a bid to enforce the order - I will be content to let the matter stand as it is with the judgement registered in the Register of County Court Judgements.

D S Barnes
Taunton
Somerset

Rich Mellor's numeric program.

```
10 REMark Program to INPUT numeric
   variable only
100 REPEAT LOOP
110 RP=0
120 CLS#0: INPUT#0, a$
130 IF a$="":NEXT LOOP :REMark Check if
   empty string
140 FOR I=1 TO LEN(a$): if a$(I)INSTR
   '0123456789'=0 :BEEP 2000,10 : R
   P=1 : EXIT I
150 If RP = 0 : EXIT LOOP
160 END REPEAT LOOP
170 Variable = a$ : PRINT variable.
```

Oily

My microcassettes generally give me excellent service, as I only use them for making copies of programs as I write them. However, one of them contains a home-made program which keeps a permanent menu-driven file and program-access 'catalogue' available, and as such is under heavy use.

Recently the cassette seized up (without a full back up copy!), producing a few fruity expressions from the human interface.

Having read that the tapes are lubricated when new, a slight amount manual dexterity allowed the substance in question to be transferred from a brand-new tape to the old one, enough just to allow the data on it to be recovered before the map declared all sectors as bad.

This seems to confirm that heavy duty use of a tape causes it to heat up due to friction between the pad and tape-head, reducing the oil viscosity and allowing the oil to run off the tape to run dry, creating temporarily bad sectors.

I always manage to recover data after 'Bad medium' messages by allowing time for the heads and tapes to cool.

My question is this: is it possible to obtain a suitable oil to humidify the microcassette felt-pads, and prevent failure?

On the subject of SuperBasic bugs, the keyword NEXT presents a defect on JS roms which did not occur on JM. In a FOR loop, 'next' does not verify it until the final increment step has been done, and unlike END FOR, causes the code to loop

forever.

Stephen Poole
Le Bourg

Editor's comment: I have not heard of a microcassette breaking down through lack of lubrication between the tape and tape-head before. I do not know all the technical details, and I would be very interested if somebody who worked with the microcassettes and tape could supply them. There may be room for a number of misunderstandings: tape used for continuous-loop audio cassettes (of which the mdv cassettes are one type) is of a special type which is lubricated to prevent the tape chafing as it loops against itself, and the guide spindles, inside the cassette. As far as I know it is self-lubricating, that is, the composition of the coating is such that it provides a measure of non-liquid lubrication. Graphite is an example of this kind of material, and may even be used in this case.

I wouldn't have thought that the tape would need special protection from the tape heads: usually, in audio recorders, the tape wears the heads away, not vice-versa. (VCRs are a different matter - the heads are very abrasive.)

I wouldn't put oil of any kind near the microcassettes or the tape heads! Even when it doesn't do direct damage, light oil quickly attracts dirt which will clog and abrade lightweight moving parts unless it is constantly renewed. I also suspect that the heating you experience is due to traditional QL internal overheating, rather than tape friction.

However, this doesn't explain how you were able to 'revive' your dying cassette with the help of a new one, or answer your question. I hope somebody can come up with the real explanation.

QL HARDWARE REPORT

REPLACEMENT KEYBOARDS AND INTERFACES

INFORMATION

Product: Keyboard and Interfaces
Supplier: EEC Ltd., 18-21 Misbourne House, Chiltern Hill, Chalfont St. Peter, SL9 9UE. Tel: 0753 888866.
Price: See end of article.

Rich Mellor installs one of EEC's keyboards with Keyboard 90.

Recently the QL scene has been beset by different keyboards and their interfaces. Relative newcomers to this market have been EEC Ltd., who have managed to obtain the rights to sell the German interface made by Jürgen Falkenberg, which was reviewed in February's *QL World*.

EEC can supply the interface for internal fitting, or externally in a slightly different form, using a small black box and ribbon cable which can be purchased from EEC for £17. This makes the interface much easier to fit, and enables it to be housed outside the QL.

Open up

The method of installing this other version is mainly the same as the old version: you must open up your QL and remove the 8049 chip. However, you now simply insert a ribbon cable connector into the now exposed socket, and re-insert the 8049 chip into the top of this connector. This saves having to remove the keyboard membranes (from the original QL keyboard, which remains usable), and also allows more space inside the QL. The ribbon cable is then led out of the back of the QL case with a right-angled bend, (above the joystick ports), and the QL screwed back together. It should be noted, however, that you must be careful when re-assembling the QL not to over-

tighten the four long screws in the back of the case, as this may damage the ribbon cable.

The interface itself, is then placed in the box, out of which emerges the lead with the actual keyboard DIN socket. All that then remains is to plug your keyboard into the DIN socket, and power up. If you do not purchase a keyboard at the same time as the interface, you may need to alter the two dip switches on the interface board to ensure that all of the keys of your keyboard are working. You will need to ensure that the dip switches are moved as far as they will go in the desired direction, since they can be a little stiff to move. However, with only four possible combinations, this little problem can soon be sorted out. The right combination is: Switch 2; left for AT board, right for XT board; Switch 1, left for MS-DOS 3.1 and older, and right for MS-DOS 3.2 or younger.

This version of the interface leaves the QL keyboard intact and willing to accept input. At first, my efforts seemed to render the microdrives inoperative. I have then discovered that the microdrives are in fact fully operational – my problem lay in not having switched the QL off before moving the dip switches.

On to the keyboards themselves, which are supplied by EEC. There are actually two sizes of keyboards available, which should suit most people's price range and desk space.

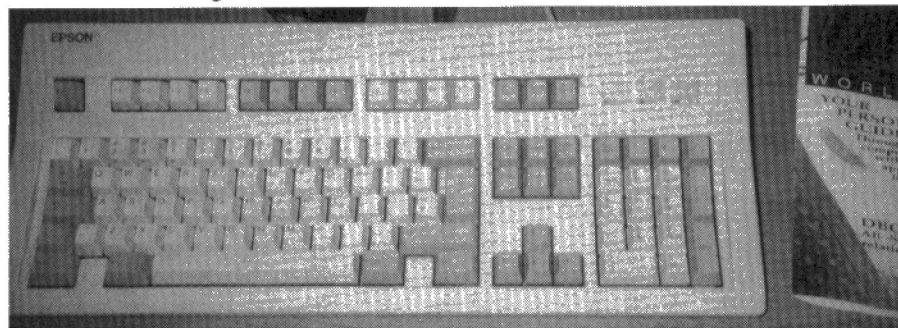
The bigger one of these is the standard Epson 102 key keyboard. This has a separate numeric keypad and cursor keys. The one supplied is actually a Swedish keyboard, which has overlays to be stuck to certain keys to convert it to a normal English keyboard. I must report however that the overlays supplied for this review had a few minor problems. One of these is that the stick-down pads had a tendency to come off the keys if you catch their edges with your fingertips, although EEC report that normally they find it difficult to remove the key-tops, which suggests I just had a bad lot. In any case, a dab of Pritt glue on each key-top soon resolved the problem.

One advantage of using these key-tops is that you can actually match them up to the correct keyboard layout for the QL interface (rather than the standard PC layout): for instance the one for backslash appears in the wrong place (it should be on the upper left key), and the symbols for the pound, '@', hash and (single) quote mark appear on the wrong keys. A few little snips with a pair of scissors soon sorted this problem out though. There are English layout keyloads available at a slightly higher price.

Key tops

Once the new key tops have been attached (they are hardly noticable on), the keyboard works perfectly, with lights for number lock, caps lock, and scroll lock (CTRL F5 on the QL). Although a few of the keys are located in a different place to the QL keyboard, the great majority are actually still in the same place (only the control keys, pound sign and backslash are actually in different places). It is therefore quite easy to convert to the bigger keyboard, although the new delete and cursor keys may take some getting used to. The numeric keypad is a major bonus when upgrading to a 'proper' keyboard, as well as all of the extra keys (see the review update in April's *QL World*.)

EEC are also supplying a smaller keyboard (84 keys) for those users who have less money and less desk space. This version is actually a French keyboard made by Sperry in dark grey (the larger keyboard is in light grey). It still has a numeric keypad, but lacks the separate



A pc-style keyboard tries to edge its way out of the picture.

set of cursor keys and control keys (such as Insert). The main problem for English users with this is that EEC have been unable to locate a source to produce new key-caps, since the keyboard is laid out in AZERTY fashion (the QL continues to read the keys as if they were set out in the normal QWERTY layout). If enough interest is shown in the smaller keyboard, EEC may look a little harder.

Once the key-tops have been replaced, nearly all of the keys on this keyboard will match up to the QL's own keyboard, except for the backslash key which again appears in the top left corner of the keyboard. This keyboard has a less positive key movement, which means that the keys do not have to move so far as on the 102 keyboard before they make contact (although this is not necessarily a bad thing). A user should try out both keyboards if possible, before deciding. I actually preferred the feel of this keyboard, but maybe that is due to my lack of experience using PC keyboards, rather than the touch keypad of the ZX81 a QL's own keyboard.

There are only a couple of points about the smaller keyboard (other than my having to rely on my touch typing skills because of lack of new key tops):

1) the function keys are actually laid out in an odd manner: they consist of two columns of five keys, the left column has the odd numbered keys rather than the

more usual (F1-F5): and

2) the legs on the keyboard do not actually lift the keyboard up enough for my liking.

One thing I did like about both keyboards (this must be as a result of the interface rather than the actual keyboards) is that having the caps lock switched on did not mean that you could only enter numbers from the numeric keypad (this is a big problem with the computers at work).

Improvement

Both keyboards are a massive improvement on the original QL keyboard (especially in the lack of any apparent key-bounce), and should find a welcome in most homes. The interface is unfortunately still a little expensive, and may put some users off upgrading to a full-sized keyboard. Another problem with a separate keyboard is the extra space needed to keep the QL, disk drives and keyboard on a desk. In my case, I have had to place the QL on a shelf behind my desk, which makes it more difficult to access the reset button, but does mean that no longer is my desk littered with cables.

Choice of keyboard is very much an individual preference, but I would recommend this system of both keyboard and interface to anyone. Users must remember that when trying out a new keyboard,

it will take a little while to get used to the extra keys (certainly on the bigger keyboard, they may find themselves pressing the pound key instead of the quote key), but after only a few hours, my four-fingered touch typing has improved to such an extent that I sometimes out-type the slothsome Quill.

Are there any drawbacks?

Well, as with anything new, it can take a little while to adapt to the new key layout, and certainly games players who lack a joystick may find it a little more difficult to use the cursor keys than on the original QL keyboard (the 84 keyboard has diagonal cursor keys, but it is much more difficult on the 102 keyboard to move diagonally). The only other problem I have come across is that Minerva's soft reset does not always recognise the new keyboard when the QL starts up again, but one can always just use the reset provided on the keyboards by pressing CTRL, ALT and DELETE.

I guess the major drawback is that I now have no excuse to stop typing, as I suffer a lot less from cramp in my fingers.

Prices:

Keyboard Interface: £75 (£69 to Quanta members)

102 Key Keyboard: Swedish £25, English £35

84 Key Keyboard: around £15

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Quill *in* Aspic

Typesetting has been an expensive business ever since William Caxton laboriously set each separate letter by hand, and even the cumbersome Linotype machine was costly to run. However, all that has changed – thanks to the QL. And Quill in Aspic of course.

Aspic, the abbreviation for Authors' Symbolic Prepress Interfacing Codes, is a way of inserting flags or codes into the text produced by a word processor so that typesetting instructions are provided by the author while keying in the copy. The coded copy is then downloaded into the typesetting computer for processing.

Savings

For anybody buying print the financial advantages of directly inputting one's own copy are considerable. The typesetting shop would charge, at the very least, £15 per thousand words for keying in text from a paper copy and these savings now mean that self-publishing a book or a magazine to a professional standard is becoming a possibility.

Be your own publisher, the Quill way.

David Drysdale shows that it is not difficult to take your Quill files to a typesetter for a professional result

The Aspic facility is not confined to the QL and Quill, of course. Any computer and any wordprocessor, including *The Editor* and *text*⁸⁷, can be used. The Aspic codes are designed to be compatible with any system that can produce copy in an Ascii format.

A booklet outlining the Aspic code system can be bought from the British Printing Industries Federation for £4. The Federation also produces another book, *Typesetting for Micro-users*, at £9.

It is not essential to insert Aspic codes into word processed copy being downloaded into a typesetting computer, however. Just words and spaces are quite acceptable and will save on typesetting costs

but, as the operator will then have to sort out the display lines, etc., the full savings cannot be made.

Aspic

The Aspic book makes learning the system as easy as possible by detailing it on three levels: essential Aspic, standard Aspic and supplementary Aspic. At the essential level the learner would only have to remember nine codes and in straightforward work these would probably cover most needs. What they do is to separate headings from text, change fonts between Roman, italic and bold, and indicate paragraphs with or without indents.

As an example, the first level heading in the copy would be prefixed with the unshifted code h1 set in square brackets, ie [h1] and the end of that heading would carry [1x]. The first text level would carry [t1] and the second level text [t2].

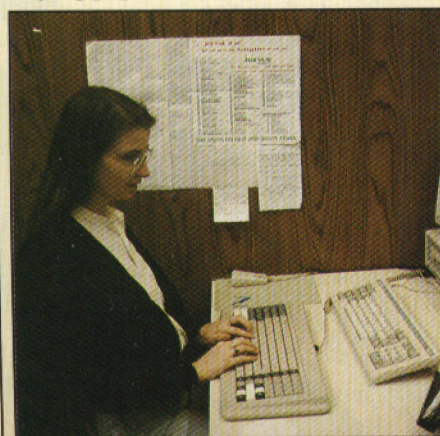
At this stage of the keying no decision needs to be made as to type size and style as, once the different type components have been identified, it is a simple matter for the typesetter to key in this information.

Any QL user will find the insertion of the Aspic codes and the production of an Ascii file quite easy but problems will arise with the compatibility of a QL formatted disk to the printer's own computer. I decided to find a printer who specialised in working from disk so that I could learn about the whole process.

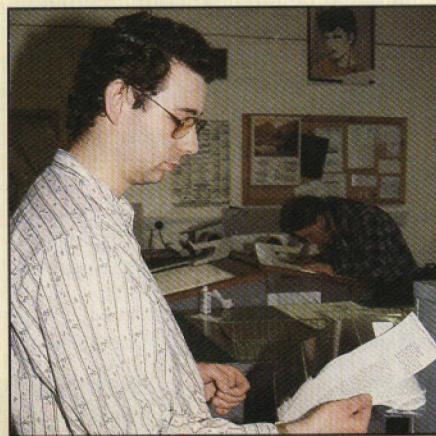
Ascii

I took two 3.5in disks along with me, one containing an Ascii file produced by myself on the QL and the other with the same story which had been converted for PC compatibility by Dennis Briggs of Adman

Keying paper copy.



Checking a galley proof.



Making a photographic bromide.



Services using the *DiscOver* program.

The printing company, Janesway Graphics of Middleton, Manchester run a specialised service for the production of short-run books and magazines and advertise disk conversion as one of their services. The managing Director, Paul Hicks, introduced me to Neil Robinson, one of his typesetters, and we began to load the disks.

Destination

The first one failed to load. It was the Ascii disk produced by myself on the QL. I had carried this out by using the print command, and when the program asked "Current, whole, to printer?" I changed the destination to FLP2_FILENAME.

Because QL disks rarely come into his office, Paul did not have a conversion facility for them and he would use a specialised service to do this. He looked through the conversion service catalogue and came across the QL with Quill listed as the word processor. Other QL packages such as Editor and text⁸⁷ were not mentioned so we do not know if any difficulty would be encountered here. The conversion fee would be around £20, so a fairly large print job would be needed to justify this cost.

The other disk, produced by Dennis Briggs, loaded immediately. It had to be cleaned up a little as the left hand margin setting came up as a block of twenty spaces and the end-of-line codes had to be removed. The copy was converted into a

Word Perfect file for these operations and a program called *Blueberry* was used to remove the unwanted codes. The file was finally taken into a *Magnatype* program for typesetting.

A low cost conversion service is offered by David Batty of Sector Software who, for £6, will convert a 3.5in disc from a QL to an IBM compatible and include a 5.25in floppy disc as part of the package. There is also a program, *Super Media Manager*, which enables the QL

to produce IBM compatible disks. This program costs £50 and can be obtained from Sector Software.

Once the copy is in the typesetting computer things move quickly. Display typefaces are selected for the coded display lines and suitable body fonts for the text matter and the job is soon being printed photographically in the darkroom. To my surprise, most of the output was in galley form, or columns of text on strips of bromide paper,

and the pages were made up by the cut and paste method.

With desktop publishing being so advanced I assumed that all pages would be made up on screen. Jamesway Graphics certainly have the equipment to do this, but find that for many jobs the paste-up method is more commercially viable, especially on work with integrated pictures.

After paste-up a negative was made of the finished pages and a positive image deposited on to a thin metal lithographic plate. Lithography, perhaps the most common form of printing used today, works on the disaffinity of oil and water.

The metal plate was wrapped round a roller on the printing press and, after inking, the image was transferred to a rubber roller. At this stage the image was in negative form which became positive again when it was transferred to paper.

Colour

Where colour pictures are being printed the image is separated into four separate colour plates, magenta, yellow, cyan and black, and the pictures are produced by printing each colour over the others in perfect register.

I would advise any QL owner to visit a modern printing house even if there is no immediate printing order required. It will clearly show that a desktop outfit and a laser printer are not necessarily needed. By working hand in hand with professional typesetters and printers the owner of a humble QL can produce perfect print quite easily.

OVER THE HILLS AND FAR AWAY

by David Drysdale

Every weekend you'll find them. In the early hours of Sunday morning, while many breakers are sleeping off the previous night's binge, the dedicated DXers are on the hillsides contacting far away places that CB was never intended to reach.

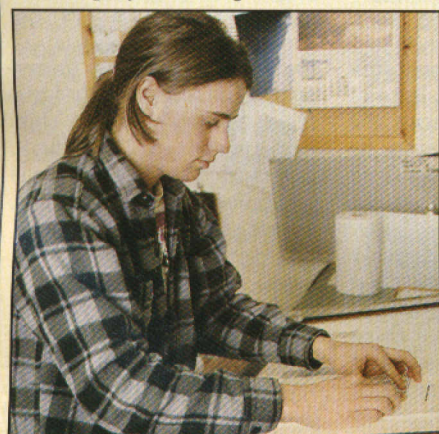
The logic is simple. The radio mush has died down because so few people are on the air and the high position gives the signal an unhindered path. Getting through the mush is also helped by being on the side of a hill instead of at the summit which is open to interference from every direction. Finding the exact spot to give maximum advantage can only be done by trial and error and, once found, this spot is jealously guarded from other DXers. This is understandable. A single breaker or a small group working together is OK but one DXer who found a perfect spot on a country pub car park let its location be known to all and sundry.

As a result the car park - and the pub itself - was taken over one night by a gang of yobbo breakers who turned it into a noisy late night party. The screaming, obscene language and vandalism so enraged the landlord that he banned breakers from the spot altogether.

I first came across the hillside people when I listened out from a canal boat which was fitted with CB. I was moored in a quiet spot in the Midlands when, quite unexpectedly, a booming voice came over with a strong Lancashire accent. I didn't think my little rooftop magmount would have the power to get back - but it did. He was calling from Winter Hill, near Bolton in Lancashire, and we had a long chat about hillside DXing. When the holiday was over I decided to learn more about hillside CB and so contacted 'Computerman', personal Alan, the secretary of the Chadderton Breakers DX club which is based in Oldham, Lancashire. The members of the 'Chaddy Breakers', as they are known locally, often DX under the club callsign 'Charlie Delta X-Ray' followed by a two digit club code.

Alan introduced me to his club member Mac, who uses the handle Cavalier when not DXing under the Charlie Delta code. Mac began his CB operations with a rig which, he admits, was confiscated from his schoolboy son. He had bought the set for the lad not knowing anything about CB and when he tiptoed into his son's room one evening to switch the set off after the boy had fallen asleep he was shattered at the language and filth coming through the speaker and disconnected the rig immediately.

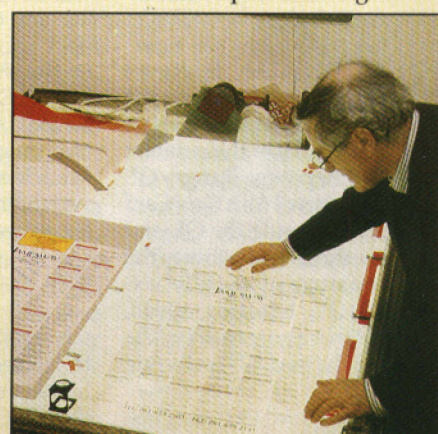
Make-up by cut and paste.



Shooting the master film.



Print master before platemaking.



Pledge from EEC on QLs

■ EEC Ltd. reassured the Quanta AGM on the supply side.

Tony Phipps at EEC Ltd. writes: "At the Annual General Meeting of Quanta questions were raised about the future use and availability of the QL.

"EEC are the principal if not the only supplier of new QLs and assured the meeting that they felt they had sufficient stock to ensure product to UK customers throughout 1991 at least.

"When stocks of new product have been sold, re-furbished machines will continue to be

available and, bearing this in mind, and the fact that many machines have been in use for several years, particularly in office and work environments, are making a special offer of £50.00 off their standard prices of £125.00 for a complete kit with a JM roms and £150.00 with a JS rom, in exchange for the user's old QL, working or not working. To take advantage of this offer, which may have to be limited, customers can send in their old QL (complete keyboard unit only) and they will get a new re-

placement unit in the original Sinclair packaging. This will consist of a keyboard unit, software wallet with four cartridges, leads, and feet but will be without the power supply unit and instruction book although these will be available at an extra price of £12.00 and £8.00 respectively for those without them.

"To make this offer attractive to overseas users, an inclusive postal charge of £10.00 will apply, and EEC are interested in contacting stockists in any overseas area.

"A further reason for these offers lies in the shortage of spares, instruction books, power supplies and some of

the semiconductors used, and also to make way for a range of PC product which will shortly be launched, although it was emphasised to Sinclair users that the Sinclair Spectrum and QL items particularly will continue to be available and will be regularly advertised in *QL World* and Quanta magazines for at least twelve months; and there is no reason to think that they will not be available for a further two to three years after that!

For further information, contact: EEC Ltd., 18-21, Misbourne House, Chiltern Hill, Chalfont St. Peter, Bucks. SL9 9UE. Tel: 0753 888866. Fax: 0753 887149.

Miracle Leaps

Simon Goodwin reports on Miracle's prototype Gold Card.

Miracle Systems have leapt past the ST and Amiga with their latest upgrade for power-hungry QL users. The new 16 bit *Gold Card* fits entirely inside the QL and delivers three to four times the performance of a fully expanded QL, boosting speed, disk and memory capacity. The top model costs £375 including VAT.

The Gold Card was launched

at the All Formats Show in March. Prototype units feature a 12MHz 68000 processor and two megabytes of 16 bit ram. Miracle expect to have a 16MHz version ready for first deliveries, scheduled for 26th April.

Radiator

A small gold-coloured radiator projecting from the left side of the computer is the only sign that the QL has been upgraded.

After a few hours the heat sink is warm to the touch, but not hot. Power comes from the usual QL supply. Despite its speed and capacity, the Gold Card takes less juice than the Trump Card.

The hardware is densely packed into the 14mm deep space beneath the QL keyboard. The top layer of chips includes the new processor and disk controller, in modern square packages, with lesser

logic gates nestling underneath. The core of the design is *Ingot*, Miracle's custom chip. Prototypes use a 12MHz *Ingot*, but a scaled 16MHz version is scheduled to arrive as I write; expect a full review soon.

34-way

There is just room for a 34-way disk socket beside the heat sink. This supports from one to three floppy drives, for a total

capacity up to 9.6 megabytes. The new floppy disk controller boosts disk speed and space. It suits standard QL drives, with capacities up to 720K, but can also handle the PC/AT capacity of 1.44 megabytes on HD 3.5 inch disks. Suitable drives are now available at the same price as older 720K units; Miracle offer cased HD drives at £150 for a pair. These can pack 9K on each track, giving twice the usual transfer rate, yet they are compatible with 720K media. The cost per byte for disks is about the same.

The controller also supports the latest 3.2 megabyte floppy disks. These squeeze 20K onto every track, using double-sized sectors. Data moves at 4.44 times the speed of 720K drives,

yet the drives can still read and write 720K or 1440K disks. Such drives and disks are still relatively expensive—Miracle apparently paid around £10 each for disks to test the interface—but prices will fall as four megabyte unformatted capacities becomes the next standard.

SIM chips

Four SIM chips hold two megabytes of fast ram. Part of this space overlaps Sinclair's QL rom and display memory; the card copies the rom into fast memory at the start, patching it to preserve compatibility with microdrives and the network. The 68008 is disabled, but Sinclair's ZX83 custom chip

and the 8049 IPC work normally.

Access to QL ports happens at the usual speed; writing to QL screen memory is no faster, as the card uses Sinclair's display hardware, but screen drivers and scrolling are accelerated by the fast ram. The 16MHz version runs Qdos rom code at more than four times QL speed. The top 1792K of ram is un-contended, giving it 8.5 times the bandwidth of 128K QL memory.

Hybrid

This hybrid approach promises good QL compatibility—for instance Miracle's prototype cards happily run *Power 3D*, the twin-screen Elite Vector Demo that defeats Thor, ST

and Amiga emulators. You still use the version of Qdos supplied with your machine, apart from patches to suit the extra speed and Ram. *Minerva* and some obscure Sinclair roms are not yet supported, so you should state your rom version when ordering the card.

The Gold Card is compatible with Miracle's hard disk, but it monopolises the QL expansion port. It includes Toolkit 2, ramdisks, serial buffers and screen dumps, like its elder sibling the Trump Card.

The 16MHz Gold Card costs £375, or £350 for export. It has a two year warranty; trade-in terms range from £25 for unspecified QL expansion to £150 for a new Trump Card in part exchange. Miracle are on (0904) 423986.

Quanta AGM 1991

Simon Goodwin
sees Quanta AGM
machinery in
action.

Luminaries of the QL user group Quanta gathered near Sherwood Forest at the end of March, holding their Annual General Meeting at a Community Centre on the outskirts of Nottingham.

Besides enthusiasts and all sorts of QL systems, the gathering attracted one robot, an Amiga and at least one Sinclair Z88. Sunday traders included Adman Services, CGH Services, Dilwyn Jones, EEC, Miracle Systems, QBits, Qubbe PD, QView and TF Services.

As ever, the weekend workshop was a forum for discussion and display of new products. Miracle Systems' *Gold Card* was the star on Sunday, offering two megabytes of ram and a fast 16 bit 68000 processor that comfortably outpaces existing QL emulators.

QView brought a QL-controlled robot to the show, mixing Fisher Technik, electromag-

nets and a home-made interface to shuffle metal disks around a *Towers of Hanoi* puzzle. The robot was controlled by the new *Minerva RTC* board, which includes a battery-backed clock, configuration ram, and an interface for Philips' I2C peripheral bus. *Minerva RTC* costs £65, or £60 to Quanta members.

Newly-elected committee member Terry Harman offered 192K Eeprom expansion boards for £35; these are made in the UK and should suit all QLs with 128-640K ram; they are available via Quanta.

Dilwyn Jones brought his full range of programs and consumables to the meeting, along with a revised *Home Budget* package, updated to cope with Norman Lamont's prior pronouncements.

CGH Services introduced two new games for QLs and emulators; *Sector X* is a machine-coded space shooting game that features five waves of at-

tacking nasties, six types of weapon, energy balls and a horizontally scrolling MODE 8 backdrop. *Sector X* needs at least 256K of memory.

Squidgy Round the World is a 50 screen exploration puzzle. You tour the screens collecting bizarre objects and avoiding bombs and animated monsters. The animated graphics are clear and varied, moving in big steps on a 20 by 8 grid. The program is a well-behaved task, compiled with *Turbo* and *DIY Toolkit* routines; it suits 128K as well as expanded systems. *Sector X* and *Squidgy* cost £10 each on disk, or £12 on two cartridges, with short A5 manuals.

Birmingham 680XX Pub Club sent their 3D demo squad, equipped with *Dreamscape*, *Power 3D*, and now *SOLID 3D* animations. Dave Barker and Robert Nash presented their work so far, and exciting plans for the future.

The Seventh Annual General

Meeting on Sunday brought the usual dense and excitable audience, with over 300 voters in person or by proxy. Debate soon overflowed the order paper and ranged wide and free, culminating in Stuart McKnight's memorable interjection, "it's irrelevant, but it's an example", in a discussion of *Minerva* quirks.

When it came to the polling, long-time committee member and architect of *QConnect* and *Def Guide* deals Phils Borman won the chair from his predecessor and proposer, Syd Humphries; members voted to expand the maximum size of the committee from seven to nine members, adding Terry Harman and Bill Newell to the team, and confirming Bill Fuggle as Newsletter Editor.

The closing quote should go to Syd Humphries, at the end of a long and successful year, hastening along the democratic process with a weary cry of "Will you all put your hands up again, please!"

T A P R O U B L E

There must be more QL users who do not have a hard disk and/or laser printer than those who do, and it might seem like catering to a very small minority of readers to devote a significant amount of space to such hardware, but readers' letters suggest the subjects are of interest. Some readers who were hovering on the brink took the plunge and bought the Epson GQ-5000 following recent articles recommending this machine.

Apart from odd misfeeds of two or more sheets of paper at once, my GQ performs without significant fuss, virtually every day of the week. A word of caution for those users who are economy minded – using scrap paper can lead to mess. The ink or toner on the reverse side of scrap can be melted by the heat of the setting process after new toner has been applied, and the removed ink/toner then gets applied to other sheets of paper, which you may want to be good copies. Although it will be on the backs of the sheets, it can still create mess by being rubbed off. For the competent DIY type, it is not difficult to empty the collector unit, saving about £60 a time (the collector on my GQ probably got filled with ink and toner from the scrap paper).

DJC (Dilwyn Jones Computing) wrote to point out that they can supply a hard disk back-up program – *Win Back* – to enable users of the Miracle hard disk to make copies of their files to floppy disks. We hope to review this program shortly. The author of *Win Back* is working on a file-finding utility, mainly for hard disk users but also of interest to floppy disk and cartridge users. From the brief description given, it sounds as though this program will search for text strings *within* files, as well (presumably) as within file names. DJC has gradually built up its range of programs into quite a decent one, including the well known ones from Peter Jefferies and Dave Walker which were previously handled mainly by other suppliers.

Mention of hard disk unavoidably brings to (my) mind the subject of viruses. This is not a subject generally aired in the pages of *QL World*, which should indicate that QL users don't – by and large – suffer from computer virus problems. My simple mind thought that the fact of the operating system being in rom made the entry and spread of a virus unlikely, but a recent article in a well known computer magazine included the information that the Amiga and Macintosh are much more prone to

Bryan Davies 'wrestles with a virus – but where from?

virus problems than the PC, Atari and Archimedes. Either the writer had the facts out of order, or I have to revise my ideas; I had understood that the PC was the machine that suffered most, largely because its operating system is on disk and the system files can be tampered with.

The subject was only of passing interest until I (accidentally) discovered that there were traces of one particular virus in my PC. From that time on, it became a fulltime interest, and I got no paying work done for over a week, trying to get rid of the virus. A beta-test copy of an anti-virus program has been used and it gave the machine a clean bill of health, so formatting the hard disks several times apparently removed the virus. That program is claimed to deal with **about 400** viruses – so much for them not being a major problem on PCs!

No doubt you are wondering what this has to do with the QL, and the answer is twofold. The first is that it is *possible* the virus was 'donated' to me – unwittingly – by a friend and a fellow QL user, with whom I sometimes exchange disks, and the second is that I am told by someone in the QL world who has considerably more knowledge of computers than I do that he will not use hard disk in connection with anything he sells because of the danger of viruses getting onto it.

Second-hand

This is not intended to be a comment on software piracy, but it *is* much more likely that you will pick up a virus from a 'second-hand' copy of a program than from a new one, straight from the official supplier. Be careful where you get your files from, particularly if you have a hard disk. For those who run MS-DOS on their QLs, as well as on office PCs, *Conqueror* could be a way of keeping incoming disks away from the PC.

At the All Computers Fair on March 23rd, **Miracle Systems** were demonstrating an alternative approach to buying a hard disk. Their *Gold Card* is an accelerator board, and something more than just that. The board was working with standard 1.44 MB

(high-density) 3½ in floppy drives, giving twice the storage capacity of current QL disks. The drive software (rather than a light sensor in the drive) senses the capacity of a disk, making it possible to use both double-density and high density disks, and to format the former to high density; this procedure may be frowned upon by some people, but I have found it generally satisfactory on a PC.

Better still, Miracle were awaiting production 3.2 MB floppy drives (the figures are formatted – that is, usable – capacity). Operation of these drives with the Gold Card is said to be at around the same speed as the hard disk with the standard QL. You won't get the same massive storage as on a hard disk, but 1.44 or 3.2 MB per disk may well be enough for many users. In several ways, this set-up is more attractive than adding a hard disk to a basic QL, and the cost is not a great deal different.

The Gold Card as demonstrated at the Fair was working at 12 MHz, and did not have all its software in rom but the fully-functional 12 MHz version was expected shortly after the Fair, and the 16 MHz version may well be available by now too. The whole unit is on a board which plugs into the 64-pin expansion socket at the left of the QL. Apart from a small heat sink and the disk drive connector, nothing projects beyond the end of the QL; that is, it is much smaller than a Trump Card.

Despite this very welcome reduction in size, the board contains 2MB of ram, its own rom, and a driver for floppies up to 1.44 MB (3.2 MB later). The heat sink on the demonstration unit was barely warm, so there appears to be less chance of heat problems than with existing equipment. No disturbance of the QL is required – the Gold Card is plugged in, and that should be all there is to do. At start-up time, the contents of the main Qdos rom is copied into the 16-bit ram on the new board, so that Qdos and SuperBasic operations from then on run at the higher speed of the new processor (a 68000 chip, which is the 16-bit version of the basic 8-bit 68008 in the QL). Part of the 16-bit ram is used in this way, leaving the user with 1920 KB (including the basic 128 KB in the QL). The suggested speed increase is x3 for the 12 MHz version and x4 for the 16 MHz one. These may be conservative figures, and it seems likely a bench mark test would show more like x5 or more.

While writing to the screen is basically

SHOOTER

M S O L V E D

the same as before, screen information is stored in 16-bit as well as 8-bit ram and some screen operations will be faster. An additional bonus is a battery-backed clock, built-into the Gold Card. Very reasonable trade-in allowances are being offered to Trump Card owners, against sensible prices for the new unit (see current Miracle Systems' adverts).

The word-processor scene is very healthy right now. The latest version of *Perfection* I've received (as of late March) works considerably better on a JM computer than the earlier version (no change on a JS, though). It is appreciably snappier in response, which is really saying something – I wasn't complaining about speed before. It will be interesting to see *Perfection* at work with the Miracle Gold Card. This combination should make WP programs on many other computers look distinctly sluggish. The kind of operation that used to have me fuming when using *Quill* is accomplished by *Perfection* so quickly that you scarcely notice it has occurred.

For example, going from end to end of an 80-page document took about a second. The same operation on a 240-page document took the same time. This is on a basic QL with a relatively-slow Trump Card fitted. Making a very rough comparison with a rather larger document in WordPerfect 5.0 on PC/AT (nominally 10 MHz cpu rating), the time taken for 145 pages was 5-6 seconds. This time could be reduced by running the PC with only one program loaded, but it is nevertheless a fair example of how a large document slows operations down, the reason for this being that the document has to overflow to either disk or expanded memory, both of which are much slower in use than the basic DOS space. So, word-processor users, you don't need to consider a fast PC for the Book of Your Life, now. *Perfection* is cheaper, and faster. *Text*⁸⁷ has reached version 3.10. This version automatically supports 760x280 pixel resolution of the Atari QL Emulator with the new screen driver board. A command change that certainly meets with my approval is that the program now checks to see if a file already exists before saving the current memory file with the same file name. The :Type:View: and :Context:Attach:View: commands work faster now. The program also works better with the QJump Pointer Environment; if you re-size the *text*⁸⁷ window, and then switch to another program, only the screen occupied by the

window is saved and you can still see other program windows.

Further improvements are scheduled; they are likely to include a general simplification of the menu structure, which may appear in a separate version of the program. There will be a choice of 'standard' or 'advanced' menus, so that the less-experienced user will be able to avoid some of the menu options which he/she may currently find rather difficult to understand, but all options will be available for the user that wants to make use of them. As they become normal for *text*⁸⁷, the new versions will be offered in several different European languages.

The March All Computers Fair really packed the enthusiasts in. It was quite like 'the old days' of Microfairs, except that all sorts of computers are catered for in one Fair now. Floppy disk prices seem to have reached a bottom level now, at £3.50 for lots of 10 in the double-density 3.5 in size, although we managed a deal at 27.5 pence each for a lot of 120. In spite of what I (and others) have said in the past, I have yet to find any drawback to buying unbranded 3.5 in disks. Using the disks at 720 KB in the QL, they can fairly be said to be a 100% reliable. In the days when one had to rely on microdrive cartridges, and they were £4.99 each (that figure seems so enormous now that I'm doubting my memory here), there was some justification in not backing-up all data files, but there's no excuse now for not being sensible, and making at least one copy of all important files.

DJC (Dilwyn Jones Computing) has pointed out that *FlashBack SE* is being stocked by them as well as by Sector Software, not *instead* of that supplier. Additionally, it is noted that DJC and DJW are two different companies, and there is a further, unconnected company that goes under the name of DJC Computing (and is presumably nothing to do with the QL scene). Dilwyn Jones wrote the *Page Designer DTP* program, so that should help confused readers know who they are dealing with at DJC.

Readers Letters

Stephen Meech wrote expressing the feeling that the *Minerva* rom has been somewhat mistreated by the QL World team, but he did make the point that *Minerva* is a device he 'would only recommend to a reasonably competent programmer' and

that he runs two QLs, one with and one without *Minerva*, 'to have the best of both worlds'. To have two QLs, is a luxury some QL owners can't afford, of course. He also said he didn't see a 16-bit successor to the standard QL appearing in mass production; while **Miracle Systems** are not exactly mass producers, they are the nearest to that in the QL market, and they are definitely developing more than just one 16-bit QL product (see comments earlier in this article).

The alternative up until now has been to buy an Atari and a QL Emulator, and Stephen asks why we have not had lengthy articles on this combination. The reason is that regular contributors to QL World do not have this hardware combination, possibly because the Atari on its own does not really offer what either the QL or PC do, so we didn't get started on that route. Nevertheless, QL programs running on the Atari are clearly much nicer things to use and QL World supports anything that helps keep the QL scene healthy. *I've been asking for volunteers – Ed.*

PH Tanner reports his *Minerva* has been working for a month or more, and he wants to buy another one, but 'I can't get them to speak to me', presumably because he made some complaints about the one he has got. He has sent a string of letters on the subject, combining criticism with enthusiasm for the rom. Unfortunately, the technicalities of his points are out of my line, and I have not received any reply to my letter to **QView**, requesting comment on various incompatibilities.

Another person to come to the support of *Minerva* was **Ian Bruntlett**. Basically, he seems to echo Meech's comments, that serious programmers will find a replacement for Qdos of much more use than will average users, and I fully agree with this view. He did make some points that I can't agree with, though. One such was that users who are unfamiliar with Tony Tebby's pointer Interface are 'a minority'. I would suggest that, far from using it, most QL users have never even heard of it.

Like *Minerva*, it was designed for the 'techies' and was never really marketed to the wider QL World. This was why I made this point in my review of *DataDesign*, that many people would find the lack of instructions about the pointer interface make use of the database program itself less easy.

There is a significant degree of blinkered vision in the programming community,

with some programmers apparently writing programs only for other programmers. No complaint about that – unless the programs get sold to the general public. Both Minerva and the pointer interface have clear appeal to the hacker, but their usefulness to the ordinary user is variable. This is not to say that there is not a need for such things on the QL; it is just a question of whether or not they actually *do* make using the QL easier for the ordinary person who buys QL World. I have used QRam and QPac2, and found them interesting and well-executed, but they both cost me a lot of time in setting-up, and got between me and the work I wanted to do (such as writing articles). It was much quicker and efficient to use my existing set-up.

This feeling occurs with the PC too! I mainly use the text-based utilities, rather than those which involve a mouse and lots of windows and menus. One important factor for the would-be seller of programs to consider is the amount of time the potential buyer has to spare. Users who have only a limited amount of spare time may give up on a program if they can't come to terms with it fairly quickly. This is very likely why the Psion programs seem still to be the most-used programs; they are generally easy to use, and operate in a mode which prevents conflict.

Bruntlett commented that 'the derogatory remarks made by QL Users (about PCs) merely reflect a certain amount of amazement that people will put up with such systems'. The amazement at that comment was mine, as it illustrates well what I had meant in my earlier comment – there are technically-experienced QL users (who ought to know better) who make unsupportable criticisms of other computers, such as PCs, and this is not helpful to the QL scene. If there are good features in other computers, we would do well to look at them, and consider whether or not they might be worth incorporating into future enhancements to the QL.

Two features specifically mentioned in his letter were multi-tasking and networking, the implication (apparently) being that PCs can't manage either. It is true the basic, original IBM PC did not support multi-tasking (maybe not networking either) but that was ten years ago. For some years now, it has been possible to buy add-on hardware and software to make the PC multi-task and network, and the 386 and 486 PCs were designed from the outset with both functions catered for. Any PC should allow the use of pop-up resident programs which give the convenience of having several functions available at any time. The two pop-up QL programs I use – *FlashBack* and *Files II* – both work very well, and have become a basic part of the system, loaded every time it is switched on.

Does the average QL user make use of the multi-tasking capability? Apart from having utility functions such as clock, CAPS LOCK indicator, and 'free memory' read-out, constantly on-screen, what does a

normal user want? On the other hand, quick and efficient *task-switching* may be a requirement of many users, and we have had programs to give us this for many years (eg *Taskmaster*, *Q-Switch*, *QRam*, *Swapper*). Of the four mentioned, two work well but are memory-hungry, and that may conflict with the user's requirements for his/her work. One at least of the other two is more economical in memory.

Cheerful news from **J Roy Goodall** in Belize. He has got his Keyboard Products keyboard working with both an AH and a JSU QL, and seems well pleased with it now. The ordered keyboard membranes have arrived from Sector Software, and the battery pack for his power supply arrived from Frequency Precision. He has had some advice from **Tony Firshman** on the transfer of data from Psion Organiser to QL. His neighbour in Belize has a Thor XVI and is having trouble with it. He has been unable to contact **Dansoft/Thor International**, and wonders whether or not they are still in business. So far as I am aware, the practical answer for our Thor users appears to be a 'not'.

A regular correspondent over the years, **David McCullagh**, wrote to say he is still having problems printing from his Thor XVI. He can print successfully from Quill using the parallel port, but believes that *Archive/ArchDev* can use only the serial port, and this is where he gets stuck. He asks if **J Flurys** or anyone else with experience of printing from Archive to the serial port, or getting it to work with the parallel port, on a Thor XVI can give him some help. He considers himself an 'ordinary user', in that he doesn't really want any changes to the basic Qdos but would like Quill and Archive to be re-written. Who wouldn't? There have been various suggestions over the years that improvements were being made, but one has to view such statements with a jaundiced air, since they were not made by Psion. It would seem better to move on to other programs if the Psion ones don't give you what you need. Once having made the change to *text87* or *Perfection*, I can't see many users going back to Quill. On the other hand, the alternatives to Archive are only good ones if the in-built programming language of Archive are of no interest to the particular user. An updated Archive is reported as being available now, but for use on MS-DOS not QDOS. In my own operations, I have had no use of any of the Psion programs for several years. The only thing I miss is the simplicity of the menu structure in the Psion Quartet.

The complaints bag is small at present. **Mario Peer Bien** asked for help tracing microdrive cartridges ordered from **T K Computerware** around the start of this year; he hadn't received them as of the middle of March. **K Blundell** says he has been waiting six weeks or so for TK to supply him with a replacement *QSpell* cartridge, and he had got no satisfactory answer to four telephone enquiries. Although it may seem straightforward to sup-

ply a replacement of a program cartridge, I suspect this is not the case with *QSpell*. That program had a rather strange method of copy protection, and it is apparently necessary to ask the author of the program to deal with problems; as he has long since left the QL scene, it may be difficult to contact him and get the matter dealt with. TK are being asked to comment on both complaints.

Michael Cronsten reports (from Sweden) having received a replacement Miracle hard disk for the one which went astray in shipment from TK. He still has a couple of problems, though. One is that the hard disk power supply appears to overheat, and he is using a fan to keep it cool. Current units have a cooler-running drive and don't need the internal fan, normally, but Cronsten's unit does seem to need a fan. The other problem concerns the delivery of the replacement unit. He says that no Customs Declaration accompanied the unit, and the country of origin of the unit was not stated, so he has had to pay £130 in Duty and VAT, which is more than he would expect (in an EFTA country). Hopefully, he will be able to get some of this back eventually.

A cry from the heart from **Vladimir Sams**, in Belgrade. He bought a QL for his son in Washington USA, but the display (on a tv, eventually went 'on the blink', the picture being 'double and drifting fast horizontally'. He replaced the ZX8301 and 8302 chips, without getting the picture back to normal. This is where the story begins to sound a bit crazy – he then bought both a new QL and a spare motherboard, and had display problems with both of them. An rgb monitor that worked with an Amstrad PC20 didn't work correctly either (does anyone know whether or not his display is compatible with the QL?).

Next step was to have the Timex-Sinclair User Group in the USA check his QLs with another power supply, Sinclair monitor, and cables, but no solution was found, apparently. Moving to Yugoslavia, his own JS QL started having a similar display problem. He has a JM which was still ok (as of the end of February), but is afraid that will go the way of the others. It is hard to believe all these faults are related. My feeling is that the tv in the USA put paid to all three QLs there; maybe the problem in Yugoslavia is another duff ZX8301. Any other ideas?

INFORMATION

Epson GQ-5000 laser printer:
SCS Computer Sales plc., 24 Kingfisher Court, Hambridge Road, Newbury, Berks RG14 5SJ
Tel. 0635 529229

WinBack:
DJC, 41 Bro Emrys, Tal-y-Bont, Bangor, Gwynedd LL57 3YT
Tel. 0248 354023

Gold Card:
Miracle Systems, 25 Broughton Way, Osbaldwick, York YO1 3BG
Tel. 0904 423986.

QL SCENE

VAT UPDATES FROM SD

SD Microsystems have updated their small business systems to handle the new 17 1/2% VAT rate.

Updates will be available to all subscribers to SD's Support Scheme, which costs £12 a year. A new version of *General Ledger*, their popular book-keeping system, is available, with an extra VAT code for handling 'mixed' transactions

split between zero and standard rates. This allows the user to enter the actual tax amount as a separate figure, instead of calculating it back from the gross total. Some traders will find this particularly useful.

SD are also able to offer accessories and software support for the C.Itho printer. Ribbons are £3.95 plus £1 post and packing per order. A very limited

number of UK standard (£sign) daisywheels are available — contact SD for prices and availability. Software support for C.Itho owners includes Quill printer drivers on mdv and disk, with variable line spacing and fonts. SD may also be able to develop drivers for other printers at reasonable cost on request. A version of the *Small Traders Pack* has been

tailored for the C.Itho, including *Mail Merger*, which links mailing list records with Quill documents.

SD's list includes the Small Traders Pack £24.95, Sales Invoicer Pack £19.95, General Ledger £19.95, all three £50; Integrated Stock/Invoicing £39.95 (expanded QLS), Mail Merger £14.95, Filer Pack (Psion companion) £14.95. Post and packing per order £1 UK, £2 Europe.

Orders and enquiries to SD Microsystems, PO Box 24, Hitchin, Herts. Tel. 0462 422897.

Meeting

A Quanta London Sub-group workshop will be held at the Polytechnic of North London, Holloway Road, London N19 (near Holloway Road tube station) on Sunday 9 June from 10am. The Group recommend approaching the Holloway Road from the North by way of the A1 even if approaching London from other angles. Driving and parking in the inner London suburbs can be frustrating for the unaccustomed. Holloway Road underground station is a short ride on the Piccadilly Line from Kings Cross.

Quanta

The March 1991 issue of Quanta contains a number of reports from local groups, two up and coming workshops in March (including the group AGM), an article by Dennis Briggs on eproms in the QL, a number of hardware tips, an index of the 1990 issues, letters and small ads. More information from the General Secretary, Ron Dunnett, 38 Brunwin Road, Rayne, Braintree, Essex CM7 5BU.

Little fax for Agenda



The Microwriter Agenda palm-sized computer now has an ensuite fax modem, developed by Dataflex and Microwriter Systems. The modem, slightly larger than a large cigarette packet, connects to the Agenda by a custom serial interface, and doubles as a standard modem and a hands-free dialling medium.

"The real innovation lies in ease of use," says Microwriter Systems Managing Director Chris Smith. A document is prepared in the Agenda as for printing, the modem is plugged into the Agenda and a telephone point, the number dialled from the user's telephone list stored in the Agenda and sent to 'print', which transmits the document. Various print formats are available.

Users can check transmission via a built-in speaker. The Fax Modem has a built-in standard V24 Hayes 2400 baud modem, and is battery or mains powered, and has an rrp of £349 (without the Agenda). Enquiries to Microwriter Systems, 2 Wandle Way, Willow Lane, Mitcham, Surrey CR4 4NA. Telephone. 081 640 8813.



THE NEW USER GUIDE

In the fourth instalment of our New User Guide for the Sinclair QL, Mike Lloyd runs alongside Chapter 4 of the Sinclair QL User Guide and looks at characters and strings, touching on binary digits and Ascii code as he goes.

SECTION FOUR

Text Handling

Devoting an entire article to a straightforward subject like text characters might sound slightly dull. After all, you type a letter at the keyboard and it appears on the screen. However, the way the QL treats characters reveals many of the secrets of the way computers operate. Furthermore, unlike some other languages *SuperBasic* has a rich range of commands devoted to character manipulation. Like other Sinclair computers the QL has by far the neatest text management functions in the world of computer languages. It will take much more than a single article to explore the subject fully, so this is just a start.

Although it might sound surprising for such a capable computer, the QL has no natural understanding of what an alphabet character or a piece of text might be. Absolutely everything in the computer's memory is formed from whole numbers between zero and 255 inclusive. Before looking at characters we must spend a little time seeing what the QL uses to represent them.

Computer memories are composed of millions of tiny transistors etched onto a silicon chip. When the computer is working, each transistor can be holding an electrical charge or not; in other words, transistors can be on or off. With just two possible states to be in, a transistor is not by itself capable of holding a great deal of information. However, if two transistors are grouped together the possible combinations of states is four:

T1 = OFF	T2 = OFF
T1 = OFF	T2 = ON
T1 = ON	T2 = OFF
T1 = ON	T2 = ON

If the 'ons' are used to represent 1 and the 'offs' represent 0 then the states shown above can be written as 00, 01, 10 and 11 – the first four numbers in the binary counting system.

A group of three transistors can represent eight different states and a group of five transistors can assume 32 states, and so on. By adding a transistor to a group the number of possible combinations of ons and offs doubles.

Each transistor holds a 'binary digit', a value of 0 or 1. In the early days of computers groups of five binary digits, or 'bits', were considered sufficient for many tasks because it was the smallest group of bits which could still represent every one of the 26 letters in the alphabet.

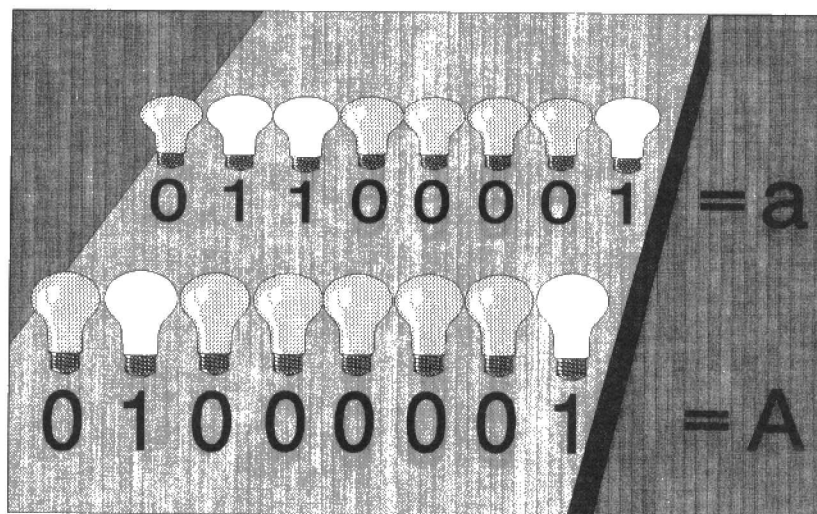
These days almost every computer groups its transistors into eights, thus allowing 256 combinations to be formed by each group. A group of eight bits is a 'byte', and the fact that each byte can have one of 256 states explains why the QL character set has 256 characters in it: it is because each character is represented by a single byte.

Many years ago, the Americans introduced a standard arrangement for all computer character sets called the American Standard Code for Information Interchange, more familiarly known as Ascii. It means that a sentence of text stored in one computer can be transferred to another and still make sense because both computers use the same number sequence to represent characters.

It is too logical, of course, for the letter 'A' to be Ascii code 1. The first 32 codes are 'non-printing' codes such as the 'newline' character, the tab character, the backspace character and so on. The first 'printable' character in the Ascii code is the space. Next comes the group of symbols found, in order, above the number keys on an American typewriter. These almost match those found on the QL, but not quite.

The digits between zero and nine inclusive are the next group, beginning at Ascii code 48 and ending at code 57. Some more symbols fill the gap between the digits and the start of the alphabet to force 'A' to have the Ascii code of 65. Sixty-five is not particularly noteworthy as a decimal number, but in binary it is 01000001 (see **Figure one**).

Ascii



The upper case alphabet follows in its usual order before giving way to yet more symbols. The lower case alphabet starts at Ascii code 97, which is more significant as a binary number, 01100001. The final number allocated a character in the Ascii code is 127. This leaves exactly half the possible codes unspecified so that individual computer and printer manufacturers can add their own characters.

The upper reaches of the character set on the QL contains all sorts of interesting symbols, including arrows, foreign letters, mathematical symbols and a whole set of values reserved to represent the QL function key combinations. If you have a printer with the IBM character set, the higher values contain a completely different but equally interesting set of characters, including box characters.

Because of the way the QL manages keyboard input, it is possible to obtain the non-printing Ascii values and still use the lower part of the Ascii table for other characters, although only the Minerva cpu takes advantage of this quirk. The exception is the newline character, Ascii Code 10 or CTRL-J, which is always a newline.

The title of this section of the *Guide* is 'Characters and Strings', so it is time to explain what a string is. Quite simply, a string is a group of one or more characters, although there is also a special string which contains no characters at all – the so-called 'null string'. Strings can be stored and manipulated in the same way that the QL treats number values, provided that some rules to distinguish between text and variable names are observed.

You will recall that you can assign a number value to a variable name with the LET command, such as:

```
LET hello = 12
```

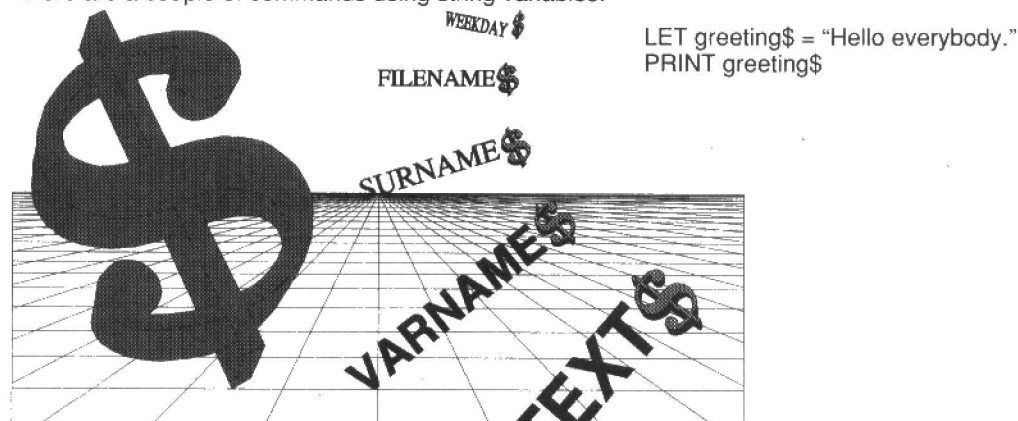
If the command PRINT hello was typed in, the computer would print 12 because that is the value which hello represents. In order to print the word "hello" it must be typed in quotes:

```
PRINT "hello"
```

Strings are stored in variables exactly as numbers are, but the variable name must end in a dollar sign in order to distinguish a string variable from a number variable. Looking at it from the computer's point of view there is an obvious reason for this imposition. Everything in the computer's memory is a sequence of numbers, so how is the computer supposed to know if a group of bytes are supposed to be a number or a piece of text?

One answer is to use different labelling rules, as SuperBasic does. Other computer languages have other means of achieving the same effect, but all Basics use the dollar method (**figure two**). The main advantage of the Basic method is that both the computer and the programmer are immediately aware of a variable's status simply by examining its name.

Here are a couple of commands using string variables:



All string variable names end in a \$

Strings and dollars

SuperBasic includes some extremely neat ways of adding strings together (known as 'concatenation' in textbooks) and splitting them into smaller strings. SuperBasic also has a facility called 'coercion', which means that a string of digits can be treated in the same way as a normal Basic number.

& and spaces

The ampersand is used to add strings together, such as:

```
LET greeting$ = "Hello " & "world"
```

Note that there is a **space** at the end of the first string, otherwise the result would be "Helloworld" and not "Hello world".

Let us now suppose that we want to print the first five characters of the string we have just created. What could be simpler than this:

```
PRINT greeting$ (1 TO 5)
```

The tenth letter of the string can be printed by the command:

```
PRINT greeting$ (10)
```

The same idea is used to assign values to other variables, so to create two variables from the greeting\$ string, type:

```
LET first$ = greeting$ (1 TO 5)  
LET second$ = greeting$ (7 TO 11)
```

A couple of technical problems relating to strings need to be covered here. If the double quotes are used to signify the beginning and end of a string, how on earth can a string include double quotes? The following statement is clearly going to cause the computer problems:

```
LET speech$ = "He said "Goodbye" and left."
```

Sinclair's solution is typically simple: where text includes double quotes, use single quotes (apostrophes) to begin and end it. Where text includes an apostrophe, limit it with double quotes. The only rule is that whatever you use to start a string must also appear at the end. The correct way to write the above command is:

```
LET speech$ = 'He said "Goodbye" and left.'
```

A second problem centres on the length of a string. It would be extremely useful to be able to measure the length of a string. SuperBasic includes a valuable little keyword called LEN which provides this service:

```
PRINT LEN("Hello")  
PRINT LEN(speech$)
```

The first example is not terribly useful. If you have typed in a string you can also measure it for yourself. The second example shows the true value of LEN because the length of the variable speech\$ might be unpredictable for any number of reasons.

Quotes

Continue printing on the same line

Force a new line

Tab 8 spaces

PRINT "TEXT"

VAR, NAMES | 12345

Useful Print Separators

Semi colons

Up to now we have been using PRINT and LET pretty much interchangeably in the examples. PRINT statements are useful in tutorials because the results are immediately visible on the screen. However, the PRINT statement has some interesting variations not shared by the LET command.

So far, every PRINT statement has resulted in text or numbers being printed at the beginning of a fresh line. The AT statement introduced last month can influence where the next print will appear, but even this can be an awkward way of managing the screen layout.

The PRINT statement comes to the rescue by allowing several items to be printed with just one PRINT command. The items are separated by punctuation, rather like the use of commas to separate parameters in WINDOW and AT commands. In PRINT statements, however, the punctuation marks take on special meanings and are described as 'print separators'.

A semi-colon forces the next PRINT item to appear immediately following its predecessor rather than beginning a new line. A comma tabs to the start of the next eight-character-wide column. The backslash forces the next print item to appear on the next line (**figure three**). Print separators can appear at the very end of a PRINT statement so that they affect the next PRINT command. You are allowed to put two or more print separators together, for example to tab by 16 spaces with two commas.

To put all of this into some practical application, let us write a program which will produce multiplication tables on the screen. All programs, even apparently simple ones, need to be planned out so that the end product meets the original requirements efficiently. The first step in the planning process is to understand precisely what is required. Our plan is to:

1. Declare which multiplication table to print.
2. Clear the screen.
3. Print "1 x ? = ??", to "12 x ? = ??"
4. Stop.

The first two steps of the plan are easy:

```
100 LET number = 5
110 CLS
```

The third step involves a whole set of PRINT statements, each one of which looks quite complicated. As is frequently the case with program designs, it is necessary to break down the overall step into smaller sub-steps. What is needed is a single PRINT statement in the middle of a loop which counts from 1 to 12 before stopping.

- 3.1 Set a counter equal to 1.
- 3.2 Print "counter x number = ??"
- 3.3 Add 1 to the counter.
- 3.4 If the counter = 13, go to the finish.
- 3.5 Go to Step 3.2.

Apart from the actual PRINT statement, which is still a little vague, the overall plan of the program is clear enough to begin writing the commands. The PRINT statement is going to be composed of some text and some numbers with the appropriate print separators. Once again, we need to break down one of the planned steps to reveal a little more detail. This time the SuperBasic language will be used directly:

```
PRINT counter; " x "; number; " = "; counter * number
```

An examination of the listing and the plans printed above show how easy it is to translate a clear design into a working SuperBasic program. Using the same technique, design and program the following exercise:

Type in a single string containing all of the three-letter abbreviations for the months of the year ("Jan Feb Mar..."). Now produce a program which slices out each of the months and prints it on a separate line. Hint: create a loop surrounding a single PRINT statement.

LISTING 1

```
100 LET number = 8
110 CLS
120 LET counter = 1
130 PRINT counter; " x "; number; " = ";
    counter * number
140 LET counter = counter + 1
150 IF counter = 13 THEN GOTO 170
160 GOTO 130
170 STOP
```

Note: change the value of "number" in Line 100 to obtain different multiplication tables.

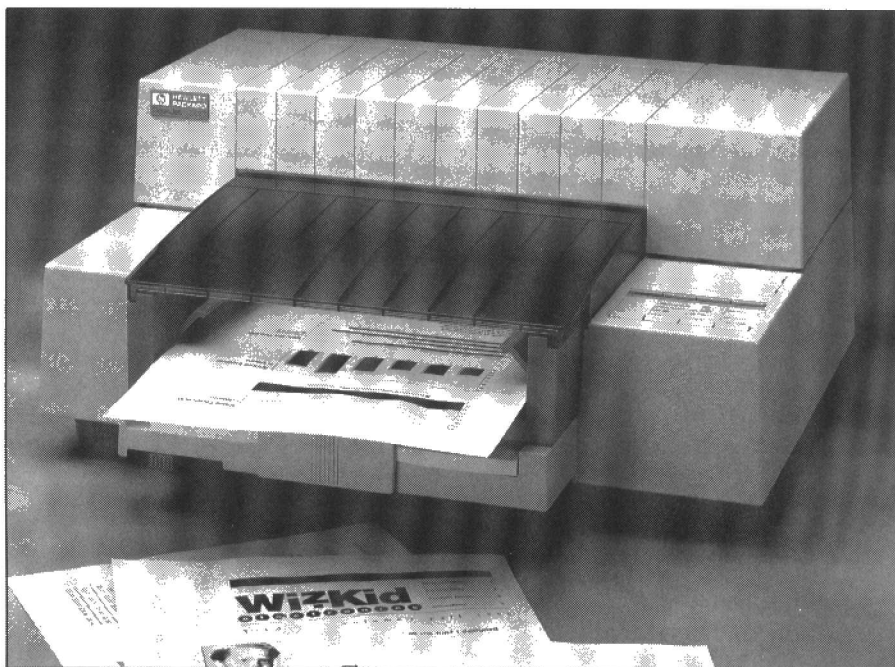
PRINTER REPORT

I John Parkin made an unexpected, if not entirely waterproof, friend.

(1) THE HEWLETT PACKARD DESKJET 500

The Hewlett Packard Deskjet 500 is an exceptional machine. I am highly delighted with it and, if you have a need for quality output at a reasonable price, I have no hesitation in recommending it. Why? I'm afraid you'll have to read on to find that out, but I've tried to avoid a too-technical review and concentrate on a user's experience. I did not set out to buy a Deskjet 500, and since the way I made my decision covers the things that ordinary buyers have to consider, I thought I'd share the process. The QL used has a JS rom, CST disk interface and 512K Expanderam printing through a Miracle Systems Centronics Interface.

The first thing I had to look at closely was my intended use. I produce a lot of photocopy-ready material for my job and for my other interests – things like monthly newsletters for the Yorkshire, and English, Schools Badminton Association (some 24 sides of A4 a month), programmes, articles, substantial reports on the organisation of education, minutes, letters, worksheets etc. The printed copy of my trusty workhorse, a Citizen 120D many years old, was starting to look a little ragged and comparisons with the output of more recent printers showed that there was a lack of quality, especially without photo reduction. I needed, and could justify, an improvement in printer output and something faster without sacrificing quality, together with an automatic single sheet feeder. I was also looking for a printer that could make full use of the features of *text87* – like proportional founts in columns with headings, etc. I know these things could be done with *Quill* or the *DP Editor*, without the on screen representation, but I was going for the best I could get with the money I had.



My quest for a new printer to give the quality I needed started among the growing number of 24 pin printers, both new and discounted 'old' models. The Citizen Swift was a front runner, as were the Star, Panasonic and NEC 24 pin printers. I spent some time comparing print quality, facilities, cost of ribbons and the price of a basic printer with sheet feeder. Then I noticed that the Deskjet+ was being discounted by a number of retailers and, since the price difference was not too great, especially if you add the cost of a single sheet feeder to the 24 pin machines, I decided to have a look at the inkjets as well, especially the Hewlett Packard Deskjets. This slowed down the buying of the replacement, but I'm very glad it did. Fred Toussi of *text87* brought out a printer driver for the Deskjet+ and I seemed to have it made, especially since

you could also buy a plug in Epson FX80 emulation cartridge for the Deskjet. Then the reason for the discounting became obvious – HP had brought out the Deskjet 500. This was cheaper and had more founts built in, including the proportional CG Times.

The quality difference between the Deskjet 500 and all the 24 pin machines I had looked at was so great I took the plunge purely on quality grounds, hoping

that Fred would bring out a driver for the 500 later. (Even if he didn't, since the 500 was compatible with the +, I could still use the + driver and the FX emulation would allow easy use with virtually every program written.)

I did half consider a laser printer, but the initial expense, and the cost of all the extras like memory and the extra expensive laser founts, put lasers right out of consideration. I was not a business user spending someone else's money so there was a limit – £400 to £500. The interesting thing was that, when I compared the laser output with the Deskjet 500, in spite of the price difference, there was little practical difference in quality. For once the advertising was right – it was 'laser-quality output at a personal printer price'.

One other Deskjet advantage over lasers, especially for people who work in the

PRINTER REPORT

early hours of the morning, or who have sensitive ears, is the lack of noise. No more shutting the doors all round the house to contain the noise of pins hammering away — you could not tell I was printing. The sort of rubbing, sliding sound it did make when printing was not even loud when I was seated next to it, and what little sound there was did not carry beyond the room it was in. What's more I don't just mean the printing noise but also the noise that it doesn't make when it's waiting to be used — no drone, whirr of a fan or the machine ticking over, that you get with the laser printers. All you get is silence — it's magic. This was a feature I didn't really appreciate until I worked close to a laser printer but now it's something I value very much indeed.

Technical details can be easily got from the Hewlett Packard information pack (see address at end), and I'm still waiting for HP to publish their Technical Guide, but a brief outline is needed to fully appreciate this machine.

In essence there are three important parts to the Deskjet 500. First, like our QLS, the power pack is separate and can be located some way from the printer. Being separate the weight of the machine itself is kept down.

The second part is the body of the printer. This has clean stylish lines and sits impressively, with the centrally placed mouth of its single sheet feeder, covered with a frosted acrylic lid, wherever you find it most convenient. There is no need to make space for paper to be fed to it, either from behind or below, nor to arrange for printed sheets to be collected. This is all handled by the 100 sheet capacity automatic single sheet feeder — the paper is fed in from the bottom half of the feeder and collected in the top half.

This was another feature that I didn't really appreciate until I'd used it. Apart from not having to feed paper onto the sprockets and arrange the printing area to allow proper feeding and collection, I had no perforated edges to tear off any more! The body of the printer contains all the mechanical bits, dip switches for the adventurous, the slots for extra memory or font cartridges (more of these later), and the control panel to manually select printer features. The sheet feeder has worked faultlessly.

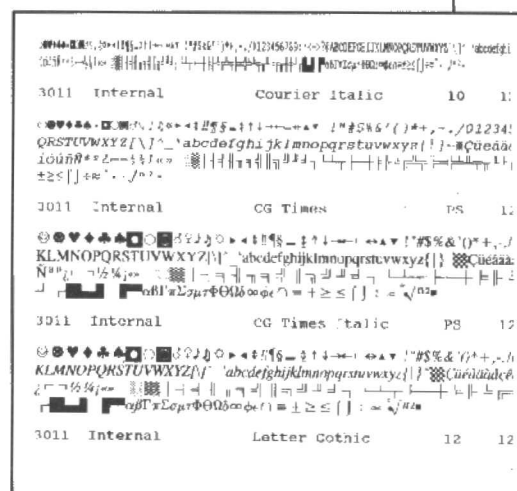
The third part is the inkjet cartridge. This little unit not only contains the ink, but also the tiny jets that do the printing. Unlike a dot matrix printer, where you change the ribbon but the print head stays until it needs replacing (very expensive), with the 500 every time you replace the ink cartridge you have a new set of jets. This is why I count it as a separate part of the machine, and it also goes some way to explaining the cost (about £15.00) of the cartridge. Having said that you can buy kits that allow you to refill your old ones, at about one third the cost, or refilled ones at about two thirds the cost. I haven't tried these out yet so I cannot comment on how good they are. Needless to say HP recommend that you use their new ones only.

How many sheets will a cartridge print? This is one of those questions to which there is no accurate answer. It all depends upon what it is you are printing. If you are printing a lot of graphics made up of solid blacks (and these look superb on the 500) it will not last as long as when you are printing text in draft mode. At 500 sheets it works out at about 3p a copy, at 1000 sheets 1½p. The ink itself is claimed to be 'NEW water-resistant ink' but this is one claim you have to take with a pinch of salt — unless I was supplied with the 'old' 'new' ink cartridges, or the previous ink was diabolical. It does take a little while to dry, and the paper mechanism allows for a brief rest period prior to floating the finished sheet into the collection tray. This does not hold up printing, but if you take the page out at this stage you need to exercise great care not to smudge it. The quality of the output more than makes up for this though — as does the ease of replacing the cartridge where all you have to do is lift the lid, snap out the old and snap in the new.

Inkjets

The tiny inkjets give, in letter-quality mode, 300x300 dpi from a matrix of 30 (horizontal) by 50 (vertical). In draft mode, using 15 (h) x 50 (v), it gives 300 x 150 dpi. The graphics resolution range is 75, 100, 150, 300 dpi. Resolution is as good as a laser, and you don't need extra memory for graphics output. If these figures mean little to you, have a look at the printed output and you will be impressed. You can get up to three pages a minute. In letter-quality mode you get 120 cps at 10cpi, and in draft 240 cps. Again it depends on what it is you are printing. Remember this is very, very quiet printing as well — no pins going hell for leather and rattling your eardrums. I have not laboratory tested the speed claims, but it seems pretty fast to me.

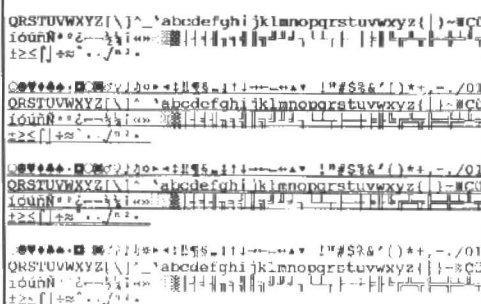
With the standard machine you get Courier, Courier Italic, CG Times, CG Times



Italic, Letter Gothic and Letter Gothic Italic. A range of other features, depending upon the printer mode and font in use, includes bold, expanded, underline, double underline, super-subscript, half-height and half width. A point worth noting is that to get a larger size than 12 point, in portrait orientation, you have to buy the extra fonts in one form or another, at about £60 for a collection on a cartridge or for a soft font collection. The Times Roman and Helvetica go up to 30 point. If the font has been designed for the 500 it can also utilise kerning to make the spacing of letters look that little bit better. Of the fonts supplied in the 500 my favourite is the CG Times. This is a proportional font and gives a quality look to the output. The others are all in fixed pitches, ranging from 5 to 24 pitch. These have their uses, especially in tables and for slightly larger headings, but to my eye do not look as good on a full sheet.

Plug in font cartridges are available covering a wide range of fonts. To use them all you do is slot them into the guide rails and press home (with the machine switched off of course). They slot in solidly and are then selectable either from the front panel or via software. Soft fonts can also be bought and used providing you have the extra memory needed to download them, up to 512K can be added to the 500 if both slots are used. Again, like the ink cartridge, it is possible to get cheaper non-HP fonts, if you are prepared to do a little work. PC (let's use their good bits) shareware distributors have disks of shareware fonts for the HP and IBM compatibles. Mine were from Elfing (USA) via Shareware Elite (Cornwall). Not being a programmer, but understanding the principles, I'm looking to use them with the QL. If I succeed I'll pass on the information; if you've already done it please let me know. Exploring the full range of fonts is something I haven't yet done, but I'm looking forward to it in the near future.

The 500 will print on the paper lengthways (landscape/long orientation), but you need the proper fonts to do this.



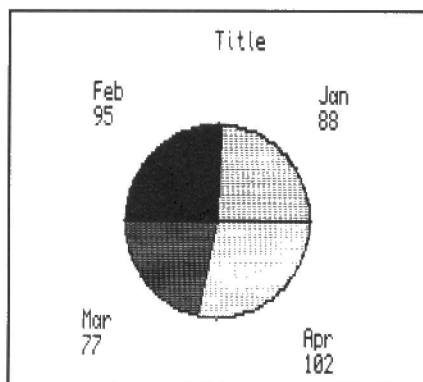
Apart from a quick test just to prove that the built in fonts work, and they do, all my work has been in portrait (vertical) orientation so I can give little guidance on this aspect save to caution against expecting to be able to use all fonts in either orientation.

This is an extra, ie you have to buy it. It comes in the form of a plug in cartridge and replaces the internal fonts. With this you can use the 500 as if it was any FX printer without any changes to your printer drivers. All the Psion programs, and all the others I tried including text87, fountext88 and DP's *Professional Publisher*, can be used as they are, without any alteration to the basic FX driver that normally runs with the program. The quality of the text is improved beyond all recognition and the black in the graphics dump is superb. You have available Pica, Elite, Proportional, Compressed and Italic combinations in pitches from 24cpi to 10cpi and expanded.

If you are into redefining fonts you can even download your own fonts making use of the increased definition available with the HP 500 ie the 500 does not restrict you to using non-consecutive dots. The manual has a good example, in basic, of how to do this. The only slight drawbacks with this cartridge are, firstly, that you cannot access the other features/fonts of the 500 while it is plugged into its slot. It must be removed first. Quite easy really, even allowing for switching off and on again, but a pity it couldn't be controlled by the panel, or software, switches. Secondly the graphic dumps are only as good as a dot matrix. This is not surprising really since that is what it's emulating, BUT there is one big plus – the blacks show no streaking over large areas and straight lines are sharp.

The main manual is a well printed document that clearly outlines all the main features of the 500. It is easy to follow with neat illustrations covering any addition to the machine, eg snapping in a new ink or font cartridge. It has a summary of the printer commands, the Level 3 HP PCL language, detailing the print feature they apply to, and their decimal and hex equivalent, and a couple of examples of how to send the codes that worked fine. This is the same language that HP used on their early Laserjets. A couple of dealers did tell me that I could use a Laserjet 11 driver, with a little modification, if all else failed.

Using only cut sheet paper the size is limited to US legal (8 1/2 in x 14 in), US letter (8 1/2 in x 11 in) and A4 (210 x 297 mm), but it can handle envelopes 9 1/2 in x 4 1/4 in if you so want, and feed them manually. The paper used must be between 16 and 24 lb. In fact most A4 paper, photocopier, Bond/letterhead paper I've tried seems to work fine, though watch out for papers that allow the ink to spread as these take the edge



off the definition, literally.

Most of the previous text has covered bits of this but there are a couple of specific points I'd like to cover/stress. For the easiest use with the QL buy the Epson FX Emulator cartridge, plug it in and go – text87, fountext88, DP's the Editor, Professional Publisher etc. all work fine.

For those who can amend/write printer drivers enough information is given to get you started. Changing the control codes so that DP's The Editor can print using the built in Deskjet fonts proved to be quite easy. I did find, though, as a non-programmer, I needed to either enter the initial letter of the word in the text where I changed fonts twice, or change the way the way the codes were entered. No doubt I'm doing something wrong but my little 'bodge' does work.

Printing from SuperBasic proved to be very easy indeed – just send the control codes followed by the text. The FX Emulation Manual gives an example of how to construct a simple graphic and print it out using data statements – easy, honest. All that's needed is a little patience.



I reason that if I can do it so can most others.

Using text87 with their Deskjet 500 Driver needs a little care at the moment. The CG Times font used in the 500 is a little narrower than the standard Times font used by Hewlett Packard and right justification with the CG Times is not quite right yet. Mr Toussi is aware of this and is testing an updated version as this is being written. Don't let this fact put you off, as with sensible use of page size and rulers a rather pleasing ragged right can easily be obtained. If you really want right hand justification you can always use a non-proportional font, or the standard Times cartridge, or the FX Emulation, until the update is ready. Fountext88 only works with the FX emulation.

The Deskjet 500 comes ready fitted with Centronics Parallel and RS 232c connectors – yes that's right both. Only one can be used at a time though. I have used the Miracle Systems Centronics Interface without any problems whatsoever and I suspect, though I haven't tried it yet, that the RS 232c output via the Tandata Modem Tower would also work.

All in all I have found the Deskjet 500 to be a superb machine. The quality of the text output and the internal fonts is excellent, you really have to see it in front of you to fully appreciate it, the graphics (albeit only through the FX Emulator at the moment) is very good, as the samples from Professional Publisher show, and it is wonderfully quiet and unfussy in use. Apart from the QL itself this is probably the best buy I have ever made.

When I've saved up my pennies for the fonts I have my eye on, ie the Roman, Helvetica, Global, Schoolbook, Triumvirate and Garamond, or converted the Elfring fonts to the QL, whichever comes first, I will give you a run down on them – in graphic detail.

For further information, contact: **Hewlett Packard, UK Customer Information Centre, Cain Rd., Bracknell, Berkshire, RG12 1HN.**

I bought my Deskjet 500 by mail order using the magic plastic card, from **Novotech, Unit 7, Admiral Park, Airport Service Rd., Portsmouth, PO3 5RQ. Tel: 0705 664144.** They were very quick, easy to deal with, as well as being the cheapest I could find – about £370 for the 500 and £50 for the FX Emulation (+ VAT).

The untested, as yet, Shareware ESF Deskjet Fonts were obtained from **Shareware Elite, 25, Cades Parc, Helston, Cornwall, TR13 8QS. Tel: 0326 564 164.**

Needless to say neither I, nor my family (not even my friends), have any connection whatsoever with any of the above firms.

(2) THE SHINING STAR LC24-10

Star Micronics UK Ltd. is Britain's second largest producer of computer printers. For over 40 years they have manufactured products which currently include laser, 9 and 24 pin dot-matrix printers. Star printers have found favour with many computer users through a combination of competitive pricing and good performance. Without doubt Star's most popular range is the "Business Series", or LC printers, including 9 pin, 24 pin and colour 9 pin versions.

As I have to produce multiple copies of finished documents for both my employer and my college course I had already decided that for speed and quality I needed a 24 pin printer, but the price would have to be right. I looked through the adverts and eventually ordered a Star LC24-10 from Mainline Business Solutions of Grantham, Lincolnshire. Their quoted price was £188 + £8 delivery + VAT., which totalled £225.40. This is quite a saving over the list price of £343.85, (£99 + VAT). As neither price includes a suitable QL interface, I bought a Centronics adapter from Miracle Systems, bringing the total cost to £254.40. Mainline were actually out of stock when I called, their batches of around 50 LC24-10s selling within three days of arrival, so although they offered next day delivery I didn't actually receive my printer until three weeks after ordering.

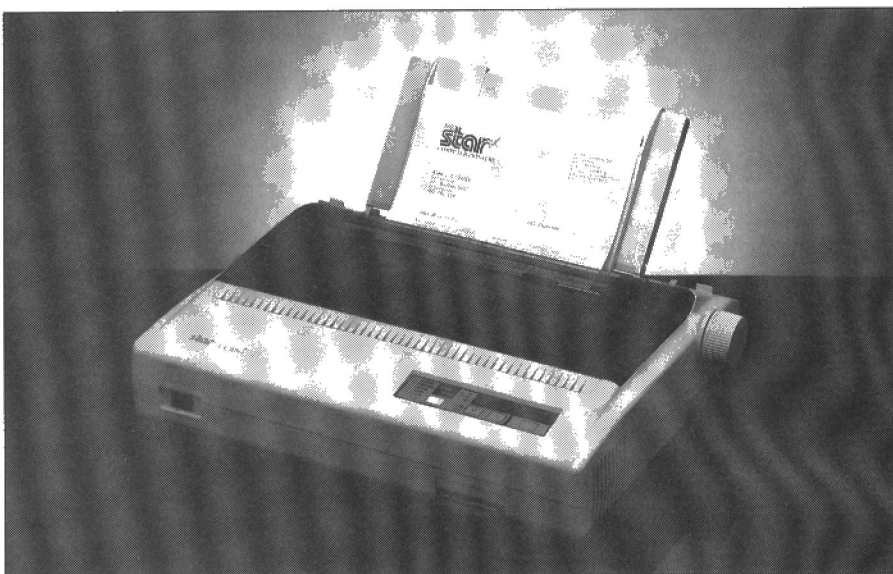
On delivery

Upon opening the box, the new owner is presented with several items including a 112 page manual, a quick-reference card and sticker, a ribbon, various plastic parts and, of course, the printer. The 'Setting Up' section of the manual shows how to prepare the printer for use.

Having unpacked and assembled the printer, I connected it, via the interface, to the SER1 port of my QL (an issue D15 JS rom version). As the printer accepts industry standard control codes, the easiest way of producing a printout is to use the Epson FX-80 printer driver supplied with *Quill*, having first used the `INSTALL_BAS` program to select the appropriate codes. A dedicated set of control codes can be created for the LC24-10 in order to utilise some of the more advanced options, with the manual providing a 31-page appendix of control commands which could be issued via the printer driver, or directly from SuperBasic. **Table 1a and 1b** show the printer driver which I use to print letters and most of my documents.

The table is fairly easy to follow, but the **TRANSLATE** section may need further explanation.

Ian Thompson's Star LC24-10 guides him with a quick-reference card.



TRANSLATE1: this tells the printer to print a £ sign instead of a $\neq$. The printer should be configured to use the American character set by using the dip switches as shown in the manual. As the £ sign only occurs in the British set, every time a £ occurs this translate code switches the printer to the British set, prints a £, then switches it back to the American set ready to print any $\neq$ symbols as required, so when listing a program `PRINT#2, LIST#5` etc. don't end up as `PRINT£2, LIST£5` etc.

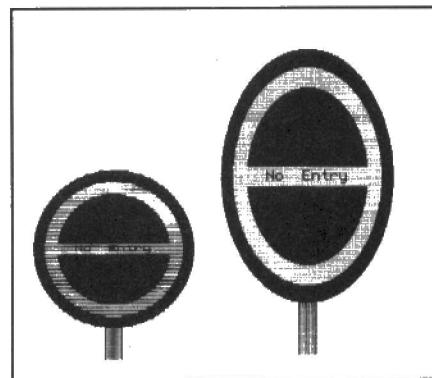
TRANSLATE2 - 10: These all affect the style and pitch of the printed letters. To make them easy to remember, I have selected symbols which correspond to `CTRL + SHIFT +` (the bold letter after each code), eg for Prestige style print, hold down `CTRL` and `SHIFT`, then press `P`. The character displayed on the screen in this case is the Greek letter mu, but as this is translated into a control code, it is not printed by the printer. Unfortunately, this means that the printer is unable to print the control code symbols, which include pi and lambda, as well as mu in this driver, which is why each is represented in the table by its decimal value (see page 6 of the 'Concepts' section of the *User Guide* for a full description of the QL character set).

I have two other printer drivers, one which uses more cryptic key choices to select the same functions, allowing the Greek characters to be printed in some of the more technical documents, and another which selects some of the other available printer styles such as Outline, Shadow and various character sizes. I have to load `INSTALL_BAS` each time I want to change drivers, which is time consuming and highlights one of Quill's

inadequacies when compared with a more modern word processor, but in practice such changes are few and far between.

Today it seems that a good near letter quality printer can produce text which compares favourably with a typewriter. However, hold a sample of letter quality text from any 24-pin printer next to the nlq version and the difference becomes obvious. It therefore comes as no surprise that the LC24-10 is capable of producing excellent text. The high density of the image, with up to 24x35 dots per character, results in lettering which is virtually perfect. There are only a few rough edges visible on standard-sized text and even then you would have to be reading the page from about six inches to notice.

The choice of type style available on the LC24-10 includes four letter quality fonts (Courier, Prestige, Orator and Script), as well as draft quality text, which are selectable from the control panel. There are also Outline and Shadow options, which are selectable directly from the computer. A variety of character sizes are available, from condensed 20 characters



The five type styles are:
 Draft characters, Courier characters,
 Prestige characters, ORATOR CHARACTERS,
 Script characters,
 and italics for ALL styles.

Print pitches vary from:-

Quad-sized 2.5CPI

to Condensed elite pitch, giving 30 CPI.

The intervening pitches are:-

Pica pitch (10 CPI), Elite pitch (12 CPI), Semi-condensed pitch (15 CPI),
 with normal proportional, and condensed proportional available in both Courier and Prestige styles.

Also available are:-

Double height,
 Double width, (5 CPI)
 Triple width, (3.3 CPI)
 and double-sized.

Various line and character spacings:



Other features:

OUTLINED LETTERING, SHADOWED LETTERING, AND A COMBINATION OF BOTH,
 Emphasized, Double-strike
 Underlining, Overlining,
 SUPERSCRIPT, SUBSCRIPT.

AND many different combinations!!

final copies, but not for draft letters. The printer will accept various paper thicknesses and can cope with three-ply sheets, allowing one original and up to two carbon copies to be printed together.

One very useful feature is the facility to extend the printer's buffer size from 7KB to 39KB, which makes it capable of storing a very large Quill document or program listing and allowing the user to continue working while the print-out is completed. In addition to extra ram, Star also offer rom cards containing new fonts such as Letter Gothic, OCR-B and Blippo. An interesting point about the ram card is its battery back-up, providing a claimed four-year memory and a flexible alternative to the rom based fonts if it is used to store down-loaded character sets. All of these cards simply slot into a port below the control panel at the front of the printer.

Using the LC24-10 with the Psion programs is painless once a suitable working driver has been installed. With the exception of *Easel*, the driver in **Table 1** will work with all of the suite. I use the default FX-80 driver with *Easel*, which works well enough, although pie charts do come out slightly elliptical. The printer also works well with *Eye-Q*, which has an easily adjustable driver to overcome the stretched circle problem. If you have *Toolkit 2* installed, any screen can be printed using the SDUMP

per inch to quadruple height 2.5 cpi, with proportional spacing available on Courier and Prestige. Again, some of these are only available by directly entering the correct code from the computer.

For users who wish to create graphic symbols or a special font, the LC24-10 will accept down-loaded characters and appendix C of the printer's manual describes the procedure for doing this. This section even includes a character generator program to make things easier, although the listing is in MicroSoft Basic for the IBM PC.

The most direct way to control the printer is via its front panel, which on the LC24-10 consists of four touch sensitive buttons, marked Style/Pitch, Quiet Mode, Paper Feed and On Line, and their associated indicator lights. As many of the functions require a combination of these buttons to be pressed in order to activate them, Star has thoughtfully included with the printer both a quick-reference card and sticker. The sticker may be positioned anywhere on the printer, the most obvious place being next to the control panel, and will probably be of more use than the card, even though that has brief descriptions of each function.

These aids are doubly important because controls have two totally separate functions, depending on whether or not they are held down whilst switching the power on. For instance, holding the Paper Feed button down during power-up makes the printer perform its 'long test', whereas the same button pressed after power-up causes the paper to advance. One of the more useful of these power-up functions is the 'Stay in Panel Pitch and Style' option, which

forces the printer to ignore any col codes sent by the computer, allowing the user to select a wider range of styles than could be contained in the Psion printer driver.

The printer's default settings can be altered using the dip (dual in-line package) switches which are positioned on the circuit board under the top cover just behind the control panel. Generally, these can all be left in the ON position, unless there is an optional extra fitted, such as the cut-sheet feeder. The printer arrived with all switches ON, giving a default pitch and style of 10 cpi Courier, though selecting a different style, either using the panel or the printer driver control codes, overrides this until the printer is switched off.

The LC24-10 includes both tractor and friction paper feed, both of which will automatically load paper to the correct position for printing. Also built in is the ability to 'park' the fanfold paper, enabling individual cut sheets to be used without unnecessary removal of the continuous sheets. This feature would be especially useful where expensive, letter-headed paper is used for

Table 1a

DRIVER NAME	: STARLC24-10
PORT	: ser1
BAUD RATE	: 9600
PARITY	: NONE
LINES/PAGE	: 66
CHARACTERS/LINE	: 80
CONTINUOUS FORMS:	YES
END OF LINE CODE	: CR,LF
PREAMBLE CODE	: ESC,@
POSTAMBLE CODE	: ESC,@,FF
BOLD ON	: ESC,E,ESC,G
BOLD OFF	: ESC,F,ESC,H
UNDERLINE ON	: ESC,-,1
UNDERLINE OFF	: ESC,-,0
SUBSCRIPT ON	: ESC,S,1
SUBSCRIPT OFF	: ESC,T
SUPERSCRIPT ON	: ESC,S,1
SUPERSCRIPT OFF	: ESC,T

Table 1b

TRANSLATE 1	: £,ESC,R,ETX,≠,ESC,R,NUL	> £,NOT ≠
TRANSLATE 2	: 161,ESC,P	> PICA PITCH, 10 cpi
TRANSLATE 3	: 165,ESC,M	> ELITE PITCH, 12 cpi
TRANSLATE 4	: 163,ESC,k,NUL	> COURIER
TRANSLATE 5	: 176,ESC,k,STX	> PRESTIGE
TRANSLATE 6	: 175,ESC,k,ETX	> ORATOR
TRANSLATE 7	: 179,ESC,k,EOT	> SCRIPT
TRANSLATE 8	: 169,ESC,4	> ITALIC PRINT
TRANSLATE 9	: 174,ESC,5	> NON-ITALIC PRINT
TRANSLATE 10	: 164,ESC,x,0	> DRAFT TEXT

PRINTER REPORT

command or a 'hot-key' defined using SDP_KEY. Toolkit 2 contains drivers for 24 pin printers and as there is no dedicated LC24-10 version I use the Epson LQ2500 driver, selecting it using the SDP_SET command.

Basic listings are easily handled by opening a channel, say #5, to ser1 then typing LIST#5. The printer's built-in buffer means that control is usually handed back to the user with about a page left to print. Again, users of Toolkit 2 can have more control and, memory permitting, define their own printer buffer to ensure virtually no pause in computing while the printer does its job.

There are only a couple of annoying problems that I have come across. These appear to be avoidable and not a problem with the printer itself. One makes itself apparent mainly with *Quill* and concerns the way that the control code symbols are handled. *Quill* treats these characters as it would any other letter and justifies the line length accordingly, but as the printer driver translates them into non-printable codes the final printed line is shortened by the number of control symbols it contained. This is really only noticeable when documents are lined up with both margins.

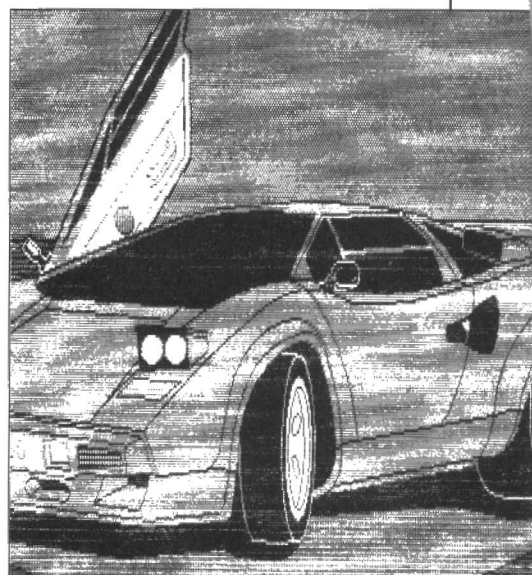
Another slightly more annoying problem concerns Eye-Q screen dumps. Having taken time to fine-tune the printer driver in order to produce 'circular' circles, it is frustrating to find that each printed line slightly overlaps the previous one. This can make some stippled effects look ungainly and also render small text largely unreadable. As well as this, each picture loses about 10 pixels from each side, but this is easier to work around. However, these appear to be problems caused by using a screen dump routine which has been written to cope with any printer.

The LC24-10 is a quick printer, with the manual claiming 150 draft and 50 letter quality characters per second. This is slower than the advertised 180/60 cps. However, this still enables it to print an average *Quill* page in around 25 seconds in draft mode, and 70 seconds in letter quality mode. The LC24-10 also has many different graphics densities, varying from 60 to 360 dots per inch, although most commercial programs will be unable to make use of the 24-pin modes. Incidentally, 360 dpi is the print density of most laser printers, underlining the high image quality available from the LC24-10 if graphics packages would make use of the higher densities.

All text modes are bidirectional as standard, the only exception being the overprinting of bold letters, and graphics modes are unidirectional. If anyone really wants to print text at just over half the speed, unidirectional text printing is available – it is supposed to produce a more accurately lined-up page, but I doubt if anybody could tell.

200 million

On the whole the LC24-10 should prove to be as reliable as any good quality printer. The print head can be expected to type over 200 million dots before replacement is necessary, which is a long time whichever way you look at it, and the procedure for changing it is described in the manual. The ribbon should print over 2 million dots before it has to be renewed, and although it appears that there is an exchange system for spent cartridges the manual contains no information about this. I will probably not attempt to re-ink the ribbon because of possible problems with the fine print head pins either clogging or corroding through using the wrong ink.



Running costs would appear to be reasonable, with new ribbons costing around £5. Optional extras include an automatic cut-sheet feeder at £65 + VAT, font rom cards at £49 + VAT and the 32KB ram card at £59 + VAT. These are Star's list prices and will probably be beaten by a dealer.

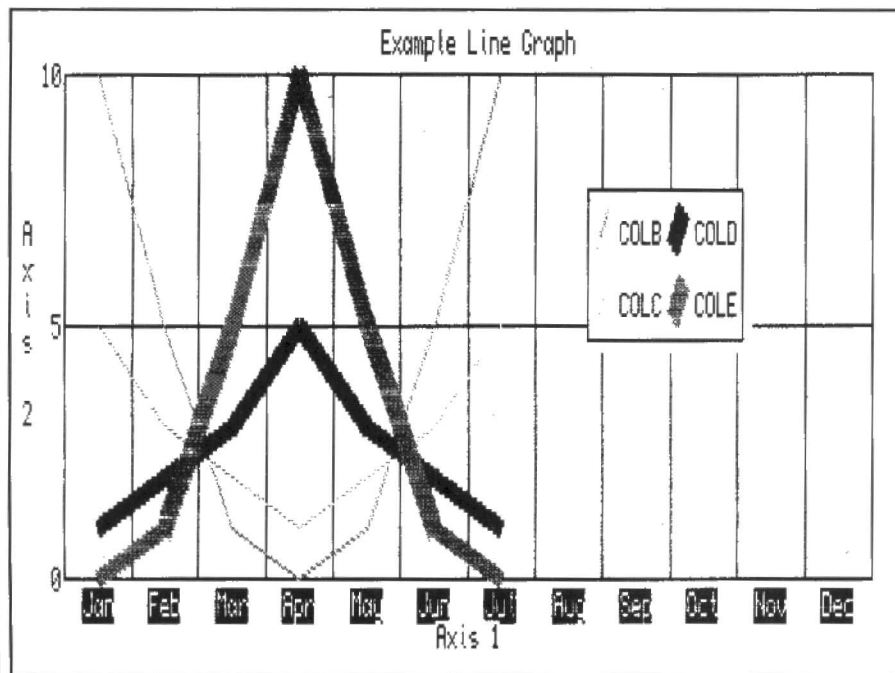
All in all, I am pleased with the LC24-10. It is a pleasantly styled unit which has proved very easy to operate and understand, thanks largely to an excellent manual which offers information without resorting to jargon. The manual's task is helped to a great extent by the quick-reference card, saving a lot of time that could be spent flicking past page after page in search of a control combination or dip switch setting. The printer has a whole host of features to cover many users' requirements and can be extended to cope with specialist functions.

Best of all is the superb value for money. The price stands comparison with a good 9-pin printer from companies like Epson, Brother or NEC. Not only that, the LC24-10 is one of the cheapest 24-pin 10in printers on the market today. If 24-pin ability at a 9-pin price interests anyone, then I would thoroughly recommend the LC24-10 to them.

Star Micronics U.K. Ltd.,
Star House, Peregrine Business Park,
Gomm Road, High Wycombe, BUCKS.
HP13 7DL.
Tel: 0494 471111.

Miracle Systems,
25, Broughton Way, Osbaldwick, YORK.
YO1 3BG.
Tel: 0904 423986.

Mainline Business Solutions,
Unit 3A, Welby Street, Grantham, Lincs.
NG31 6DY.
Tel: 0476 590045.



(3) MANNESMANN MAGIC

Even the most experienced user can be perplexed when faced with the task of choosing a printer. So many to choose from, each with slightly different features, all of which would be useful, and each of similar price. How do you choose?

A search through the adverts doesn't help. How do you choose between:

"80 col, 80cps draught, 20cps NLQ, low noise level, friction and tractor feed, serial to parallel i/f. £159.95"

and

"120cps, friction/tractor feed, Centronics i/f, Epson compatible. £169.95"

So what do *you* need a printer for? How much are you prepared to pay for it? A typical specification, with various priorities, might be to print:

- ...draft letters and memos
- ...correspondence quality for letters and occasionally other documents
- ...pictures or graphics of some kind, perhaps as letter headings or full A4 sheets
- ...listings

Personal recommendation and price usually shape the final decision, and it was by this means, and the fact that I wanted a parallel interfaced machine (so that it could be hooked up to almost any computer without fuss), that six years ago I chose a Mannesmann Tally MT80. A friend had 24 of them at work, running incoming telex, so when my QL arrived in 1984, I gave away my Olympic 66 typewriter, and all hard copy since then has been done on the 'Tally'. 60 million characters or so later (they are rated at 30 million characters, and it now needs its second replacement), it was a choice of a new head at £50, or a new printer. What better than to go back for the same again?

However, the MT80 is now officially dead. It has been succeeded by the MT81, which has a better specification and, believe it or not, a lower price than all those years ago.

The MT81 costs £159 £182.85 including VAT) and has:

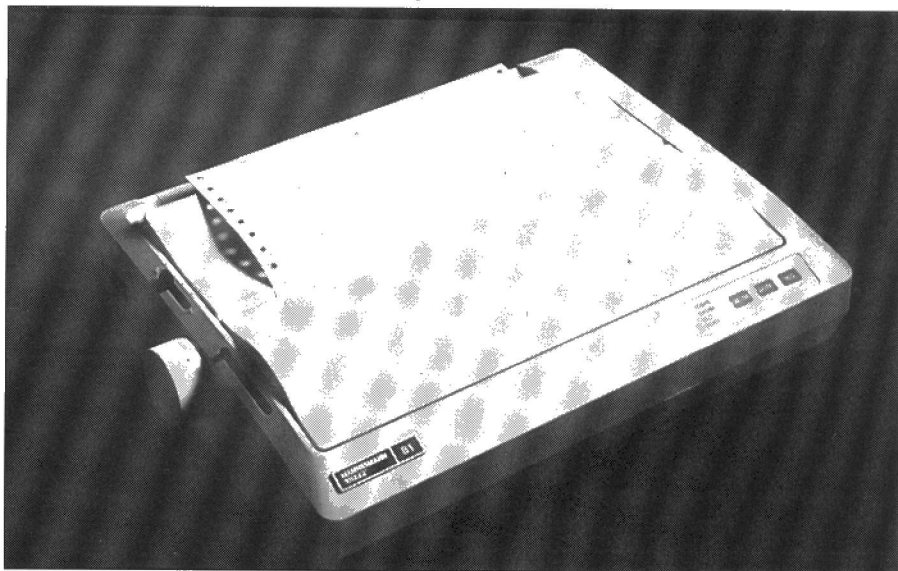
Epson FX85 and IBM Proprinter compatibility (switchable) 80 column width
Nine-needle head, giving 9x12 dots in draft, or 18x24 NLQ
130cps correspondence/26cps NLQ speeds

Friction and tractor feed, with paper parking

An 8K buffer as standard

A variety of fonts, software selectable, including double height as well as the

The new Mannesman Tally MT81 should have a wider audience, says Peter Broome.



usual double width.

As options, you may also have a sheet feeder (82), a serial interface (£40), an IEEE Commodore interface (£40), and a desktop perspex stand (£48). Its workload is rated as 2,000 pages a month.

When I got it, I unpacked it, fitted a plug, and ran the self test. All printers trigger their self-test when you hold LF and switch on. Don't they? The MT80 did, and Epsoms, and Citizens do. So does the MT81, except that it has *three* self tests, and, whereas the MT80 finished its self test in two and a half lines, the '81 covers four pages for its full character set sequence, its output of draft, NLQ, double width, double height, condensed, emphasised, double strike, superscript, subscript, underlined, and graphic characters. Tends to eat paper, that does, but you could switch it off once you're happy that it's performing properly.

In addition to USA and UK character sets, there are French, German, Swedish, Italian, Spanish, Japanese, Norwegian, and two Danish character sets in the Epson mode. The IBM mode has three sets, including some graphics characters (I haven't explored this area of the printer's capabilities yet). The fonts include most of the Greek characters in the IBM sets. These can be accessed by switching the dip switch 1.1 to IBM emulation, and sending the appropriate Ascii codes. Unfortunately, with the *Quill* translation limit of ten, you can't use it to write letters in Greek, but other word processors may give the necessary scope.

It would be useful to be able to select Epson or IBM emulation by software toggle, so alternative character sets could be

chosen mid program, but you can't. However, the dip switches are easy to reach (perhaps easier than any other printer I know), so it isn't too inconvenient if a whole document needs a different set. The switches are covered by a translucent sheet of plastic, under the ribbon case, and to alter them you pop the ribbon cartridge out and lift the free edge of the plastic. They can be easily shifted with a small screwdriver tip, or ballpen (I don't recommend using a pencil as graphite from the lead might risk short circuits eventually).

When the printer arrives it is set up for IBM emulation. Many people choose Epson compatibility. The switch settings I normally use (for Epson) are:

Left							
1	2	3	4	5	6	7	8
on	off	on	off	on	off	off	off

Right			
1	2	3	4
on	off	off	on

Reference to the Operators' Manual will clarify what each does but, for a start-up, this works. My system has a Sandy 512K expansion board, with a parallel printer port, and all printing is done through this. Previously I used a Miracle serial to parallel interface. Both routes worked perfectly with the MT80/81 printers (and others).

When getting to know a new printer, it is useful to have a routine which clarifies the codes in a way you understand. For ex-

PRINTER REPORT

ample, when the manual says ESC, "J", 6, do they mean decimal six, or the Ascii code for number six (decimal 54)? This code sequence is a spacing command and the results will be widely different. **Listing one** runs the printer through a number of its routines; it may well work with other Epson compatibles. The ending of each control line with 'reset\$' will cancel any effect of an apparently ineffective command, which combined with the next command may have unpredictable results, and also to prevent, for example, italics on one line being underlined by a previous command.

Farm tractors pull things along. However computing is not quite so... well... agricultural, so why must they pull the paper? Most printers, as well as friction feed on the roller, also have *pull* tractors, dragging the paper through downstream of the printing action. It is wasteful to have to throw away a clean sheet in order to bring the paper through to the tractor—the top of the first sheet *cannot* be lined up with the printhead for the first counting line of a 'form' (if this isn't right, the page skips will be mis-aligned).

However, the MT81 has a *push* tractor, so the top of the form can be aligned properly from the first sheet. This also straightens up the paper feed, so slight misalignments don't screw up a long printing run, as pull tractors often do, especially with the short paper path most home users are stuck with.

A useful feature of the '81 is that, if you wish to put the occasional single sheet through, you don't have to unhook the fanfold stock from the tractor. Holding the LF/FF button while pressing the ON LINE button (to go OFF line) will wind the continuous stationery back to the tractor. Selecting 'F' for friction, disconnects the tractor drive, leaving the way clear for the single sheet to be fed by the roller. And now the neat bit! When you wish to return to fanfold, re-engaging the tractor feed,

MT81 test run...

This is one-line double width...line 150
This is condensed printing...line 160
These are emphasized characters...line 170
This is double strike printing...line 180
This might be italic...line 190

This should be double height...line 210

This should be NORMAL AGAIN...line 220

This should be subscript...line 230 Normal This should be superscript...line 240

This should be underlined...line 270
Character Set 0... d i n s x #00000000
Character Set 1... d i n s x #00000000
Character Set 2... d i n s x #00000000
Character Set 3... d i n s x #00000000
Character Set 4... d i n s x #00000000
Character Set 5... d i n s x #00000000
Character Set 6... d i n s x #00000000
Character Set 7... d i n s x #00000000
Character Set 8... d i n s x #00000000
Character Set 9... d i n s x #00000000
Character Set 10... d i n s x #00000000
The buzzer should have just sounded...line 400

USA (startup)
French
German
English
Danish 1
Swedish
Italian
Spanish
Japanese
Norwegian
Danish 2

Line spacing 1 / 216ths inch
Line spacing 2 / 216ths inch
Line spacing 3 / 216ths inch
Line spacing 4 / 216ths inch
Line spacing 5 / 216ths inch
Line spacing 6 / 216ths inch
Line spacing 7 / 216ths inch
Line spacing 8 / 216ths inch
Line spacing 9 / 216ths inch
Line spacing 10 / 216ths inch
Line spacing 11 / 216ths inch
Line spacing 12 / 216ths inch
Line spacing 13 / 216ths inch
Line spacing 14 / 216ths inch
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Line spacing 53 / 216ths inch
Line spacing 54 / 216ths inch
Line spacing 55 / 216ths inch
Line spacing 56 / 216ths inch
Line spacing 57 / 216ths inch
Line spacing 58 / 216ths inch
Line spacing 59 / 216ths inch

THAT SHOULD BE ALL.

and lifting the bail roller (the guide bar holding the paper against the main roller) automatically moves the printer head to the centre (to avoid it hitching in the sprocket holes), and feeds the paper to the top of form position — clever!

The ribbons I use are Mylar film, and cost about £4 to replace. Unlike some, they are good and black when new, and last about three months of fairly hard use (my printer is shared by the QL and an IBM-compatible). They have a plastic film base, and don't look as if they'd take too kindly to re-inking, although I haven't tried it myself.

Mannesmann Tally have always been known in the trade for solid construction,

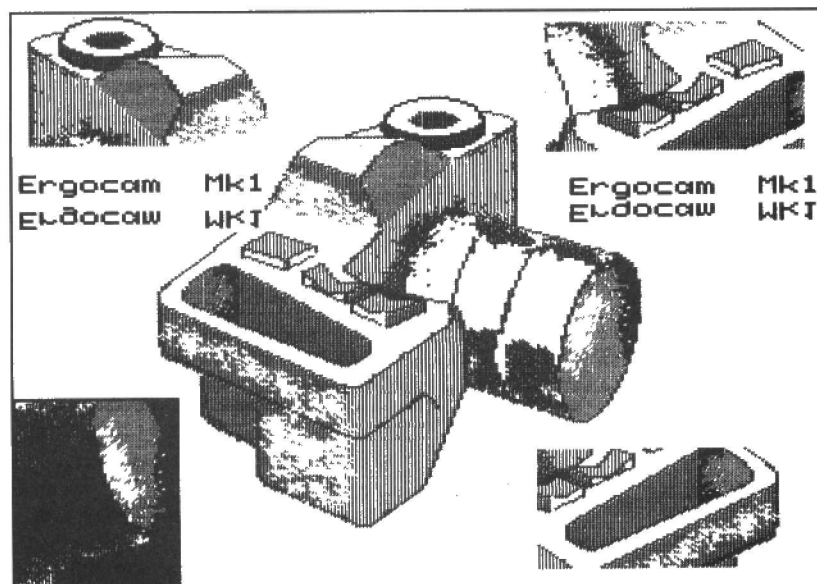
and the MT81 is no exception. Its case is made of moulded plastic, but it feels very sturdy. During the four years the '80 was in service it was taken back and forth to school daily, and worked faultlessly in an open-plan Craft, Design and Technology workshop, without fussiness about dust protection, as indeed did the QL and the equivalent of 1MB of microdrive storage.

The '81 has a slightly smaller footprint than its predecessor, 375x280 mm, plus a little for the paper feed, and some extra to get at the rocker on/off switch on the left side. The Centronics connector is on the right corner of the back, (both looking from the front). Sound levels have been minimised (bearing in mind it is a dot matrix printer), as the whole unit has been enclosed and foam padded; the only openings are the slits for the paper entry and exit. This should minimise dust entry, as well.

The MT80 had a nine pin print head, and so does the '81. Both have square pins, making the joint between each pin very difficult to see, even on draft mode. In fact, I only use nlq double print modes, when the ribbon is getting unreasonably thin. The quality is far better than many well known printers in what they call 'near letter quality'. The print rate in draft mode, of 130 cps, may not be as fast as, for example, the LX80's 160 cps, but the slower rate gives a better quality, so you don't have so much need to go at the usual crawl of nlq printing before sending out an application letter, or report.

Hardly a day goes by without involving my QL in either home management tasks (updating bank account records, or sorting the address database into Christmas cards given, posted, and abroad), or school preparation work. Much of it requires printing: policy statements, organisational documents, meetings agendas and minutes, lesson notes, and worksheets all go through the '81 without problem. It earns its living.

If it can be drawn on the QL screen, it can be printed on the '81. Whether it is a graph from Easel, or a picture from a paint-box program such as Talent Software's



```

*****
100 REMark MT81 test 121290: previous 230990 ..many.. 120389
110 RESTORE
120 OPENE3,ser1
130 reset$=CHR$(27)&CHR$(64):PRINT#3,reset$
140 PRINT#3,CHR$(27)&CHR$(45)&"1";CHR$(14);"MT81 test run...";\\;"This is norma
1 sized printing, at default values..line 140";reset$
150 PRINT#3,CHR$(14);"This is one-line double width..line 150";CHR$(20)
160 PRINT#3,CHR$(15);"This is condensed printing..line 160";CHR$(18)
170 PRINT#3,CHR$(27)&CHR$(69);"These are emphasized characters..line 170";CHR$(2
7)&CHR$(70)
180 PRINT#3,CHR$(27)&CHR$(71);"This is double strike printing..line 180";CHR$(27
)&CHR$(72)
190 PRINT#3,CHR$(27)&"4";"This might be italic, ..line 190";CHR$(27)&"5"
200 PRINT#3;REMark to give space for next line
205 REMark double height is really a ProPrinter command, and lines follo
wing may be unusual...
210 PRINT#3,CHR$(27);"["@";CHR$(4);CHR$(0);CHR$(0);CHR$(0);CHR$(34);CHR$(2);"This
should be double height...line 210"
220 PRINT#3,CHR$(27);"["@";CHR$(4);CHR$(0);CHR$(0);CHR$(0);CHR$(17);CHR$(1);"This
should be NORMAL AGAIN...line 220"
230 PRINT#3,CHR$(27)&"W"&"1";"This should be continuous elongated 230";reset$
240 PRINT#3,CHR$(27)&CHR$(83)&CHR$(49);"This should be subscript...line 240";CHR
$(27)&CHR$(84);"Normal";
250 PRINT#3,CHR$(27)&CHR$(83)&CHR$(48);"This should be superscript..line 250";CH
R$(27)&CHR$(84)
260 PRINT#3,reset$;
270 PRINT#3,CHR$(27)&CHR$(45)&"1";"This should be underlined..line 270";CHR$(27)
&CHR$(45)&"0"
280 n=0
290 REPEAT loop2
300 IF n>10 THEN EXIT loop2
310 PRINT#3,CHR$(27)&CHR$(82)&CHR$(n);"Character Set ";n;"...";
315 REMark this prints SOME of the alphabetic range, for comparison
320 FOR font= 95 TO 122 STEP 5
330 PRINT#3;CHR$(font);' ';
340 END FOR font
345 REMark this prints some from outside the alpha range
350 PRINT#3,CHR$(35);CHR$(36);CHR$(64);CHR$(91);CHR$(92);CHR$(93);CHR$(123);CH
R$(124);CHR$(125);CHR$(126);
360 READ font$
370 PRINT#3,TO 60;font$
380 n=n+1
390 END REPEAT loop2
400 PRINT#3,CHR$(7);"The buzzer should have just sounded..line 400"
410 FOR j=1 TO 60 STEP 2:PRINT#3,CHR$(27)&CHR$(51)&CHR$(j);"Line spacing ";j;" /
216ths inch":NEXT j
420 PRINT#3,\\;reset$;"THAT SHOULD BE ALL."\\;"*****"
430 LIST#3;REMark this will print a listing of the program -which you may not wa
nt !
440 RESTORE
450 STOP
460 DATA "USA (startup)","French","German","English","Danish 1","Swedish","Itali
an","Spanish","Japanese","Norwegian","Danish 2"

```

GraphiQL they have all printed clearly and accurately. Multiple passes, as with Digital Precision's *Desktop Publisher*, show no offset or mismatch. The only limitations are the normal ones for the QL's screen resolution, and a 9 pin printer.

What disadvantages have I found?

Unlike the '80, it doesn't seem possible to print very short pieces of paper on the '81 with the friction feed. It likes A4, but not the narrow report slips which I used to print on the MT80, to the envy of colleagues - parents could actually read what was said about their offspring! The '81 roller goes in search of something it

recognises, and ejects anything less than 76mm (3in) deep.

Perhaps its biggest problem is that, being targeted at industry, Manesmann Tally doesn't feature too highly in the retail outlets many of us prefer. Recently they have addressed this problem, and contacting the Sales department at:

Mannesmann Tally Ltd.,
Molly Millars Lane,
Wokingham,
Berks., RG11 2QT.
Tel: 0734 788711
Fax: 0734 791491

will furnish you with details of your nearest retail outlet. Adverts in *QL World*, and other magazines may reveal it at considerably lower prices than the official price.

As a teacher and microcomputer consultant, I have long regarded the computer as a tool. That job is more effectively done with a good printer. My experiences with the MT81 over the last few months show that it has maintained the reputation of its predecessor - a reputation for consistently producing the goods, without fuss, and for a long time.

SOFTWARE FILE

INFORMATION

Program: *Quick Mandelbrot*
Price: £8.00 disk plus 80p for p&p.

Publisher: CGH Services,
 Cwm Gwen Hall,
 Pencader, Dyfed, Cymru,
 SA39 9HA.

Program: *Qractal*

Price: £30.00

Publisher: Progs,
 Haachtstraat 92, B-3020
 Veltem, Belgium.

MANDELBROT PROGRAMS

Carl Watson draws conclusions from two very different programs dedicated to the study and enjoyment of the Mandelbrot set.

Since its discovery in early 1980 by Benoit B Mandelbrot, interest in the Mandelbrot Set among computer users has increased very rapidly. The Mandelbrot Set is a beautiful, very complex mathematical object. It has the strange property that if part of it is enlarged, images of the whole set re-appear, but slightly different to the original. These subsequent images can then be enlarged, revealing the same effect, and the process can be repeated ad infinitum. This is called self-similarity, and is one characteristic of objects known as fractals, of which the Mandelbrot Set is an example.

Mandelbrot programs can produce spectacular pictures and the QL itself has certainly not missed out on this graphics revolution, having its fair share of Mandelbrot programs. These have been joined recently by two more; Kenneth Murray's *Quick Mandelbrot* and Progs' *Qractal*.

Quick Mandelbrot

Quick Mandelbrot is published by CGH Services, written totally in machine code for maximum speed, and supplied on either disk or microdrive, with a short A5 size manual. Perhaps the best thing to do after making a back-up, is to

reset the QL and boot from the program disk. A user doing so will quickly be presented with the default picture of the Mandelbrot Set, in mode8, and a small menu, from which all the program options can be selected.

There are eight options on the

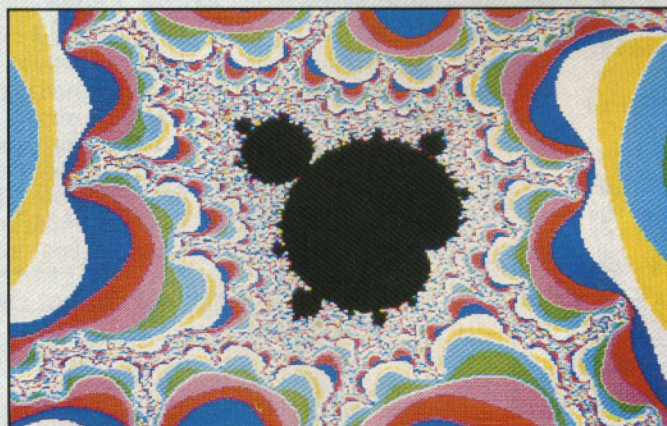
menu: accuracy, files, magnify, move menu, multitask, quit, restart and stop.

The accuracy option allows the user to change the number of iterations on each pixel of the equation that generates the Set. Increasing the number of iterations improves the quality

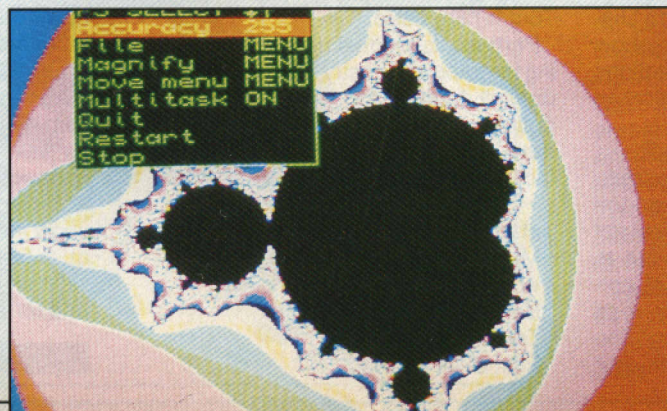
of the resulting image, but increases the time taken for that image to be generated. The number of iterations is changed by selecting the accuracy option and then using the cursor keys to adjust the number, from a minimum of 7, barely enough to produce a good picture, to 255, which should be enough for most users.

The files option on the menu includes most of the options a user is likely to need, including saving and loading screens, getting a directory, formatting disks and general file handling. Screens are saved in the standard 32K format, along with some information about their location, so that they may be re-loaded later and magnified further. Seventeen screens are provided with the program, and these are definitely worth viewing to get an idea of what is possible before creating your own. Screens generated using this package can be loaded into virtually all graphics and desktop publishing programs available for the QL.

There is also a screen dump option, on the files menu, and this allows the user to print the Mandelbrot currently on display to an Epson compatible printer. This is certainly a very useful feature, and as far as I know, *Quick Mandelbrot* is the only Mandelbrot program which supports this. Users of



Deep in the Mandelbrot set lies...



non-Epson compatible printers are advised to save the screen, using the save screen option, then load it into a printer dump program suitable for their printer.

The magnify option is perhaps the most important on the menu, allowing users to enlarge an area of the Set that they are interested in. The magnify option gives the user three options. The first Location, tells the co-ordinates of the picture currently displayed on the screen. This is useful if you wish to tell a friend with another Mandelbrot program where you found a certain picture, so that they can generate it on their own computer.

The second option allows the user to select the area of the screen to enlarge. This is done similarly to moving a box in a painting package, so the user need have no appreciation of the mathematics of the Set before producing good pictures. A third option allows co-ordinates for the area to be input directly. The co-ordinates of interesting areas of the Set can be found in many books on fractals, or magazine articles. Once the computer has been given the co-ordinates of the area to draw, press 'M' and drawing commences. Drawing can take anything from five minutes to more than a day, although most pictures will take only a few hours.

Speed of drawing varies quite a lot between different Mandelbrot programs and Quick Mandelbrot is, as described, quite quick. It took about six minutes to calculate a standard test screen I use, and this beats all the public domain programs I have tested except one; Laurence Reeves' *Mandelbrot*, although to be fair, that is the fastest Mandelbrot program for the speed of the processor I have seen on any computer.

The move-menu option allows the user to move the menu on the screen. The multitask option gives the user the facility to switch off other jobs running on the QL, so the program runs faster. Multitasking isn't something I think this program does particularly well. It does not open a screen channel which covers the whole screen, only the menu, so users of the QJump pointer environment

will find that on pressing control C to switch to and from Quick Mandelbrot, only the menu will re-appear – the Mandelbrot picture will have gone!

Although it may be possible to use a guardian window, it should not be necessary and I have written to CGH Services suggesting they correct this. Their reputation with after-sales service is very good, with upgrades to programs being supplied to users free of charge,

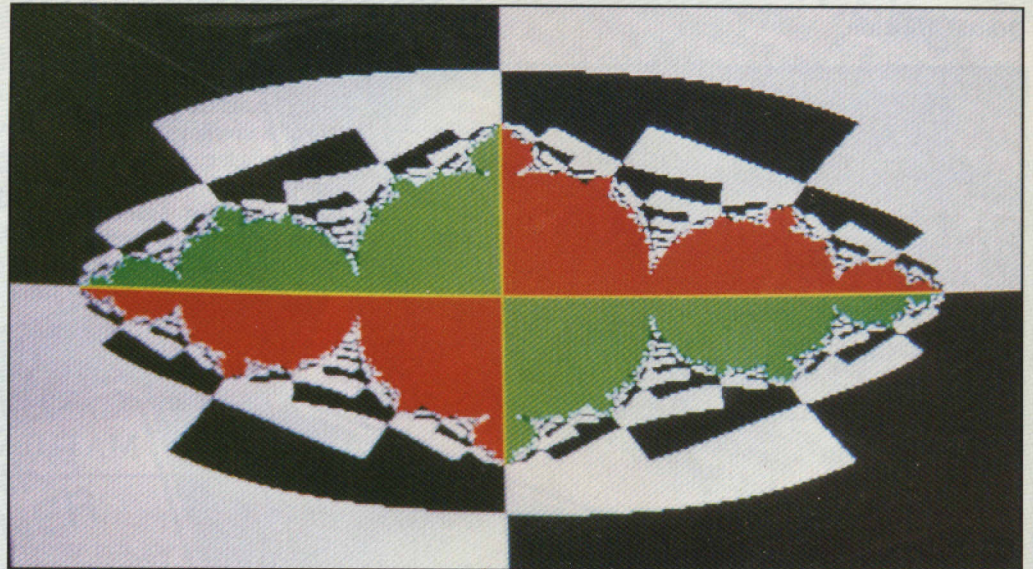
A5 size binder.

Unfortunately Qractal, unlike Quick Mandelbrot, will only run on QLs with at least 300K of ram and one disk drive. This is because it has more features and uses a different technique to store the Mandelbrot data, which will be explained later. The main menu has many options in common with Quick Mandelbrot, although there are more sub-menus and more options.

In common with Quick

package. Having said that, the rest is very straight-forward and intuitive to use.

Qractal is unique among QL Mandelbrot programs in storing in the memory, at the same time as the picture is being drawn on the screen, a 'map' of the area being drawn. This map contains data for each pixel displayed on the screen, which can then be used later. The map can be saved and provides additional flexibility over Quick Mandelbrot's method of sav-



A Julia set generated using Qractal.

and so I have every confidence that they will modify the program if they can.

The final options on the menu allow the user to return to the default screen, or to quit the program. All the options on the menu are explained very fully in the manual, and an article explains what the Mandelbrot Set is. Overall this is a very competent program, well put together and supplied by a reliable software publisher at a bargain price.

Qractal

Qractal is the most sophisticated Mandelbrot program I have seen for the QL, costing nearly four times as much as Quick Mandelbrot, but with many more features. It runs under QJump's pointer environment which is supplied, and is similar in operation to *QRam* and *QD II*, with all options being selected by standard menus. It has a simply excellent 40-plus page manual in an

Mandelbrot, pre-calculated screens can be loaded and enlarged, using a moveable resizeable box, and two disks of screens are included with the program. It is unfortunate then that the authors have not included an option to give the co-ordinates of the picture currently being displayed. The only way of getting these numbers is to look at the data file itself, which is very difficult for a non-programmer to do, because it requires that a special program be written to read the bytes in the data file, then convert them to a special floating point format, which is documented in the manual.

If the user wishes to type in the co-ordinates of the area to draw, they have to use a supplied SuperBasic program to create a parameter file, then switch back to Qractal to load the co-ordinates they have typed in by selecting the 'load params' option. This is messy and does not fit in well with the menu-driven philosophy of the

ing just the picture on the screen, although an option is provided to do this as well. The disadvantage of the map is that it can take up to 250K to store, which takes a lot longer to load than a 32K screen, and is one reason why the program needs 300K of memory.

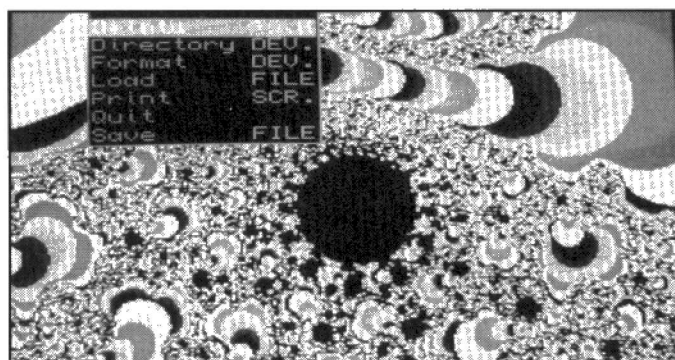
Qractal can run in Mode4, Mode8 and the Atari QL emulator's extended graphics mode. While reviewing this program I noticed that the version I have seems to have trouble changing screen modes, crashing the computer if I tried to re-draw a picture in a different mode. I hope this problem will have been rectified by the time this article appears. One feature which makes Qractal stand out from other Mandelbrot programs is its ability to change the way in which a screen can be coloured, and this demonstrates the advantage of the map.

A picture can be produced, and then the user can alter the method of colouring it. Col-

MANDELBROT SETS



Qractal in action



A control screen in Quick Mandelbrot

colouring of the area outside the Mandelbrot Set, that is the area that is not black in the photographs, can be either normal, bdm, or user selected by the install option. BDM stands for binary decomposition method and is quite an advanced mathematical technique used to improve the colouring of boundaries between colour bands, although from the user's point of view it is simply a matter of highlighting that option. Normal is, as it suggests, the normal way to colour the outside of the Set, and is the method explained in the box 'Mandelbrot Mathematics'. Install allows users to set their own colours, for different regions, and provides additional flexibility, giving a lot of scope for those with an artistic flair.

Inset

The inset colour, that is the colour of the actual Mandelbrot Set, which is black in most other programs, can be changed and there are three methods which can be used to determine its colour. These techniques rely on the fact that points inside the

Set enter into cycles, when being iterated in the equation used to produce the Set. One of the colouring options, 'Attr Count' will colour a point in the Set according to how quickly that point enters into a cycle. The second option, 'Attr Value', colours the points in the Set according to what the final value of the equation is, and last option is 'Normal', which by default will colour the Set green, although this colour can be changed by the user. Overall the colouring options used in Qractal are the most comprehensive I have seen on any Mandelbrot program for the QL.

To produce the pictures as quickly as possible, Qractal employs a number of speed up techniques. If the area the Set being calculated has its centre on the real axis, that is the horizontal line in the centre of the main Set, the program makes use of the fact that the picture is symmetrical about this line and only calculates half the picture. The other half is drawn by being reflected, rather like placing a mirror along the horizontal axis; this can produce a quite remarkable speed.

My test picture took less than four minutes, and this would seem to suggest that Qractal is much faster than Quick Mandelbrot, although it is not. If the screen being drawn is not symmetrical, the two programs are about the same speed. Qractal does have the advantage that, unlike Quick Mandelbrot, it can be run in the background, multitasking at the same time as *Quill*, for example, and continuing to calculate the map, which is then displayed when the user returns to Qractal and selects the draw option.

Qractal can also calculate Julia Sets. The Julia Set is a relation to the Mandelbrot and is produced from a similar equation. Julia Sets are selected by first loading, or producing a Mandelbrot screen, then selecting the Mandelbrot/Julia option on the main menu. This sets the centre of the calculation for the Julia

Set to the centre of the Mandelbrot currently being displayed on the screen and calculates its corresponding Julia Set. This may sound complicated, although in practice it is very straightforward, and the user will soon become accustomed to recognising which Julia Sets are related to which areas of the Mandelbrot Set.

In conclusion, Qractal is the most comprehensive fractal program available for the QL. If it was ten pounds cheaper I would have no hesitation in recommending it, but at its present price I would recommend it only to those users who have tried other Mandelbrot programs and are still yearning for more features.

Further Information.

A good book on fractals including the Mandelbrot Set is *The Beauty of Fractals* by H O Peitgen and P H Richter, ISBN 0-387-15851-0.

MANDELBROT MATHEMATICS

Before we can understand how the Mandelbrot Set is generated, we have to learn a new type of number – a complex number.

Complex numbers arise from the problem of taking square roots of negative numbers. The square root of 16 is +4 or -4, because both -4^2 and $+4^2$ equal 16. Let us consider what the square root of -16 is. It cannot be 4 or -4; in fact, it cannot be any real number, so we have to invent a new type of number, which we call an imaginary number. Going back to the square root of -16, we know that it is equal to the square root of 16 multiplied by the square root of -1. We call the square root of -1 'i'. Therefore the square root of -16 is 4i, an imaginary number. A complex number is an imaginary number added to a real number, eg $4 + 6i$. A complex number has two distinct parts and these can act as co-ordinates, for a drawing perhaps, by letting the real part be the x co-ordinate and the imaginary part be the y co-ordinate.

The Mandelbrot Set is pro-

duced by the formula, $Z_{new} = Z_{old}^2 + C$. Z and C are complex numbers, and both have two parts. The Set is generated by changing the co-ordinates that make up C, and feeding them into the above equation, with Z_{old} starting at $0 + 0i$. Once a value of Z_{new} is calculated, Z_{old} is set to that value and calculation is then repeated. This is done many times for each point on the screen, each time feeding the answer from the previous time into Z_{old} . If the value of Z_{new} goes above $2 + 2i$, the point being tested is coloured in proportion to the number of iterations of the calculation on that point. After a preset number of iterations, the computer colours the point black, and it is said to be a member of the Set, although it would actually take an infinite number of iterations to prove that it is a member of the Set. As we can see, the number of calculations needed to produce just one screen, in mode8, is enormous; we use 100 iterations, an average figure, and the QL carries out $256 \times 256 \times 100$ calculations. That's about $6\frac{1}{2}$ million separate floating point calculations!

INSIDE TURBO AND SUPERCHARGE

The QL is a fine machine for programmers, well-endowed with language compilers, yet the most popular language for commercial releases is compiled SuperBasic, rather than conventional languages like C or Pascal. It is the natural language for QL program development; every QL user owns the interpreter, and it is ready as soon as the machine is turned on.

Interpreted SuperBasic is great for short programs, if a bit slow, but not ideal for projects. Sinclair designed SuperBasic to accept long programs, but early addressing bugs prevented proper testing. Programs above 32K were unlikely to work on the prototype FB and PM roms; CALL crashed long programs until the JS rom arrived in 1985, and ATAN is still dangerous on Sinclair's final MG version.

Soon, QL programmers came to realise that interpreted SuperBasic could be unreliable, slow to load, hammered the microdrives, refused to multi-task and consumed memory as it ran. It was still the best Basic interpreter on any micro at the time.

Zip

In 1984 I had just written Zip, an integer Basic compiler on the Spectrum, and was excited by the QL and its 68008. I had programmed minis and 68000s for computer aided design, and I respected Motorola's 'orthogonal processor family'. I decided to design a compiler to read existing SuperBasic and translate it into fast, concise, multi-tasking machine code. In the end I designed three, including the best-sellers *Turbo* and *Supercharge*.

Those compilers power *The Editor*, various *Page Designers*, *Taskmaster*, *Touch Typist*, *Media Manager*, *Nucleon*, *Filebound*, *Qlipboard*, *Vision Mixer*, *Xref* and dozens of other commercial releases. They even compiled themselves.

Supercharge and Turbo are part of a family of ten compilers for five types of computer: QL, Amiga, ST, Spectrum and the Timex 2068 of North America. I designed these in 1983-86.

I was inspired by a fine book called *Writing Interactive Compilers and Interpreters* by PJ Brown, and a long corre-

I Simon Goodwin traces the history of his SuperBasic compilers from Spectrum to Amiga, detailing bugs and secret features of Turbo and Supercharge.

spondence with Chris Paradine, author of a range of TRS-80 Basic compilers.

My first experiment was a portable Basic interpreter, in Pascal on a TRS-80. Later I ported it to Spectrum *Hisoft Pascal* and *Computer One Pascal* on the QL. It was only Tiny Basic, but it worked, slowly.

In 1983 I wrote Zip as a program design tutorial. Zip was written in ZX Basic, and could not quite compile itself on a 48K system. The optimised machine-code was very fast, but limited. The first Zip compiled at glacial speed; over three passes, it averaged a couple of lines a minute.

In 1984 I got hold of a provisional *QL User Guide*, and early QLs with AH eproms. I still use the second; the first lasted only 45 minutes. I started to explore SuperBasic, armed with a Beta-test *QL Assembler* from Metacomco and Tony Tebby's manual for Qdos 1.03.

I called Sinclair Research for advice, but they told me that Superbasic is inherently uncompileable; then they wrote to say they would like to see it happen. After about a year's work my 128K QL compiled its first working QL task, a recursive factorial calculator.

Development versions generated code as English words corresponding to fundamental SuperBasic actions. I tested all the building-blocks of a task independently from the parser, splitting one colossal problem into two big ones.

Like Zip, Supercharge and Turbo generate a stream of numbers. These are instruction-codes in an idealised machine language designed to run compiled Basic efficiently. I use Reverse Polish Notation for an imaginary stack-based processor. Zip used 60 instructions; Turbo has hundreds.

The Macro Assembler replaced each intermediate instruction with a block of 68008 code, patching in details of parameters as it went, fine for testing, but too verbose for big tasks. I needed a custom-

made code generator.

For example, the routine to convert a decimal from binary to Ascii is hundreds of bytes long. If it is used many times we do not want all the code every time; in fact we do not want it in the task at all if it is not needed.

The compilers start by analysing your program with *PARSER_TASK*, a compiled SuperBasic program. This determines the meaning of the program, separates variables, program lines and DATA, and writes corresponding intermediate code in memory or in a "_TEMP" file, if the memory buffer overflows.

The code-generator only loads if the parser approves the program. It reads the intermediate codes, looks them up in the library, and generates the task file.

The code generators for *Supercharge*, and *Turbo* were written by Gerry Jackson after he converted *Super Forth* from the public domain. *The Digital C* compiler uses a similar design.

In spring, 1985 I licensed TS-2068 Zip to an agent in Texas and publisher in New York, for the American Timex Spectrum, which has a different rom but the same Z80A processor. My main attention was now focused on Supercharge.

That summer the 83K QL compiler interpreted itself into a 47K task that worked, and re-compiled itself in 20 minutes, instead of five and a half hours. The speed doubled again by Supercharge's launch in November 1986.

Supercharge

The first release of Supercharge V1.09, got good reviews; *Popular Computing Weekly* found it 'extremely impressive', *QL World* had 'no hesitation in recommending Supercharge', while *Your Sinclair* said 'Supercharge shows that you can do things on the QL that you can't on other machines.'

In March 1986 HiSoft started negotia-

tions to convert Supercharge for the Atari ST. A month later, Sinclair Research collapsed, rocking my designs for QL follow-ups.

My three year plan included a 'budget' compiler, code-named 'Lightning'. This compiler used 32-bit integers instead of decimals and generated fast but verbose 68008 code with 16- or 32-bit addressing. REM+ and REM- controlled run-time checking. I planned to follow 'Lightning' with Turbo a year later, but my London publisher was concerned that the QL market would wither in the absence of Sinclair.

Gerry completed the code-generator for tasks beyond 64K, and I had finished the 'Lightning' library and started on the parser when DP decided to scrap that project. I went to work on Turbo at once, and delivered *Turbo Toolkit* just in time for the PCW Show in September. I offered an interim product, *Supercharge de-luxe*, featuring toolkit extensions and 32-bit code, but was rejected.

Advertisements for Turbo soon appeared, using screens based on the 'head-up display' routines written for 'Lightning'. In a fortnight in November I wrote the 300-odd page manual. DP wanted to deliver before Christmas, but in the end Turbo was sent out in March 1987, thanks mainly to the efforts of Chas Dillon, a brilliant programmer and Supercharge user, and Gerry Jackson, who drove from Cwmbran to Tamworth at weekends to test the library and develop LINK_LOAD; Dave Newell, aka Newt, worked over Christmas on the Toolkit.

ST code

At Hisoft, *Devpac* author Andy Pennell developed the ST compiler. He converted the QL templates into code for the ST, and compiled Supercharge into an ST program. After much testing, Andy and Dave Howarth added an editor, tokeniser, and support for *QuickBasic* and *ST Basic* features.

Hisoft ST Basic was born in July 1987. The parse is still largely written in SuperBasic, so it supports REPEAT, SELECT, block IF, reference and value parameters, and other structured programming treats.

Early in 1988 I split with Digital Precision, and returned to *Zip 2* on the Spectrum, an optimised version of the original, incestuously compiled with Hisoft's later Spectrum Basic compiler. At last Zip compiled at a useful speed!

Faced with price competition, Hisoft stripped the libraries from their ST compiler to make *ST Power Basic*. In December 1988 that compiler learnt to multitask again, in *Amiga Hisoft Basic*. This boasted shared libraries, sprites, linking, symbolic debugging and event handling, a long way from Supercharge!

In April 1989 Hisoft paid me off to avoid future royalties and launched *First Basic*, cover-mounted on magazines and bun-

PASS: 0 LINE: 0 ERRORS: 0 WARNINGS: 0

© 1986 Simon N Goodwin LIGHTNING 1.02 Digital Precision

OUTPUT FILE: flp1_fast_32bit_test_task

Data space: 13K ☒ CORFILE ☐ Buffer size: 28K

REPORT FILE: flp1_Sinclair_QL_World_test_report

Reference: YES Listing: NO Sound: YES Pause: N/A

Cursor-controlled menu

Press arrows ↑ ↓ ← → to select the option you require.

Press SPACE to toggle a switch or to invoke LIGHTNING.

Press ENTER to edit file names. ↑ and ↓ change sizes.

dled with new computers by Atari. This 'demo' version cannot save compiled code; you must load and compile before running. It still beats LRUN on substantial programs.

I designed *Supercharge* and *Turbo*, and wrote most of the code, but I have assigned QL rights to Digital Precision. These

by LOCAL or parameter passing. All REFERENCE parameters attract extra storage, just in case.

Turbo Toolkit Bugs

I am grateful to Laurence Reeves for details of bugs in Turbo Toolkit 3.22 which have lain undiscovered since 1986. There is a small risk that BASIC_NAMES, EDIT and EXECUTE may use the wrong memory addresses if the interpreter moves while they are executed.

This can cause mishaps if the extensions are at the wrong stage of interpretation as a new task starts or the lowest transient program terminates. Compiled tasks have no problem.

The intricacies of moving Basic defeated Sinclair Research, but Laurence says "one reason Minerva might slow up a little in places on more recent versions is because it now does such things properly."

Laurence spotted that BASIC_INDEX% goes wrong if any SuperBasic name is over 127 bytes long. "I have been strongly tempted to disallow them in Minerva," he added. A correction on my last listing reminds me to "Allow names >127 chars."

To permit names 128 - 255 characters long, change five bytes with a monitor like *Qmon*. Replace MOVE.B (A3)+,D3 : EXT.W D3 with MOVEQ #0,D3 : MOVE.B (A3)+,D3 and re-direct the BNE.S five lines later to the CMP.B D0,D3 after the changes. Two bytes could be saved.

The tweaked loop takes 15% less time in fast ram. Save almost 270 per name by replacing ADD.W D3,A3 with ADD.L D3, A3 - a difference of two clocks needed to extend D3 to the 32 bit width of A3. The revision keeps 24 zero bits in the high bytes of D3, so unsigned byte and long values correspond.

Supercharge Versions

The current 'Special Edition' Supercharge is basically V1.19. My copyright notice has been removed and the Lenslok code unthreaded, although it is still there.

V1.19 was the tenth release, with 52 bug fixes compared with the first. Three undocumented points remain. If a global array is DIM'd for the first time inside a function, the result is corrupted. To cure this, DIM the array to any size at the start of the program, before the call.

Supercharge has a hidden feature, to make the compiler particularly concise. The command file contains a POKE_W 140416,1, which alters the first byte of screen memory used to pass parameters between PARSER and CODEGEN.

Copy the file to CHARGER and change its contents to POKE_W 140416,256 instead. Now MERGE FLP1_CHARGER to compile a task without line numbers, saving four bytes and a couple of microseconds at the start of each line. Reports will cite line 0, and only channel 1 will be copied from Basic; OPEN 0 but only in the task - before using PAUSE or default INKEY\$.

The big mistake is that Supercharge FOR loops are not re-entrant (oops). I used buffers inside the code to associate loop details with a given FOR statement. Turbo correctly associates loop details with the identifier, which can be refreshed

TURBO AND SUPERCHARGE

observations are my own, not those of The Turbo Team.

In February 1988 DP required me to agree not to 'write, co-author, design, prepare, market, license, sell, gift, transfer or otherwise produce any program that can compile, parse or generate code from SuperBasic programs on a QL computer for seven years'.

So *Supercharge Deluxe* and the old 'Lightning' are in limbo – but I could write an optimiser to go between PARSER and CODEGEN, or a compiler for another machine to make Qdos tasks. I have designed a lot of Basic compilers! If I wrote another it would probably be for MGT's SAM Coupé or TAOS, a new processor-independent operating system. I welcome questions about Turbo and Supercharge.

Task map

The figure shows the organisation of memory inside tasks compiled with *Turbo* or *Supercharge*. The sequence is crucial. It determines the functional design of the compiler, the number of 'passes' it makes through source and intermediate code, and the speed and size of tasks it generates. There are slight differences between Supercharge and Turbo, but the basic layout is the same.

Contrast this memory map with that of Sinclair's interpreter. Compiled tasks work efficiently inside fixed bounds, but the interpreter used 13 dynamic areas which slowly creep through memory as you run or test a program.

Tasks loaded with EXEC occupy a single contiguous area of memory. Code is loaded to the start of that area, and an adjustable amount of 'data space' is available thereafter. The order of areas inside each task determines the ease with which it can expand or contract. I shall highlight the name of each area as I explain it.

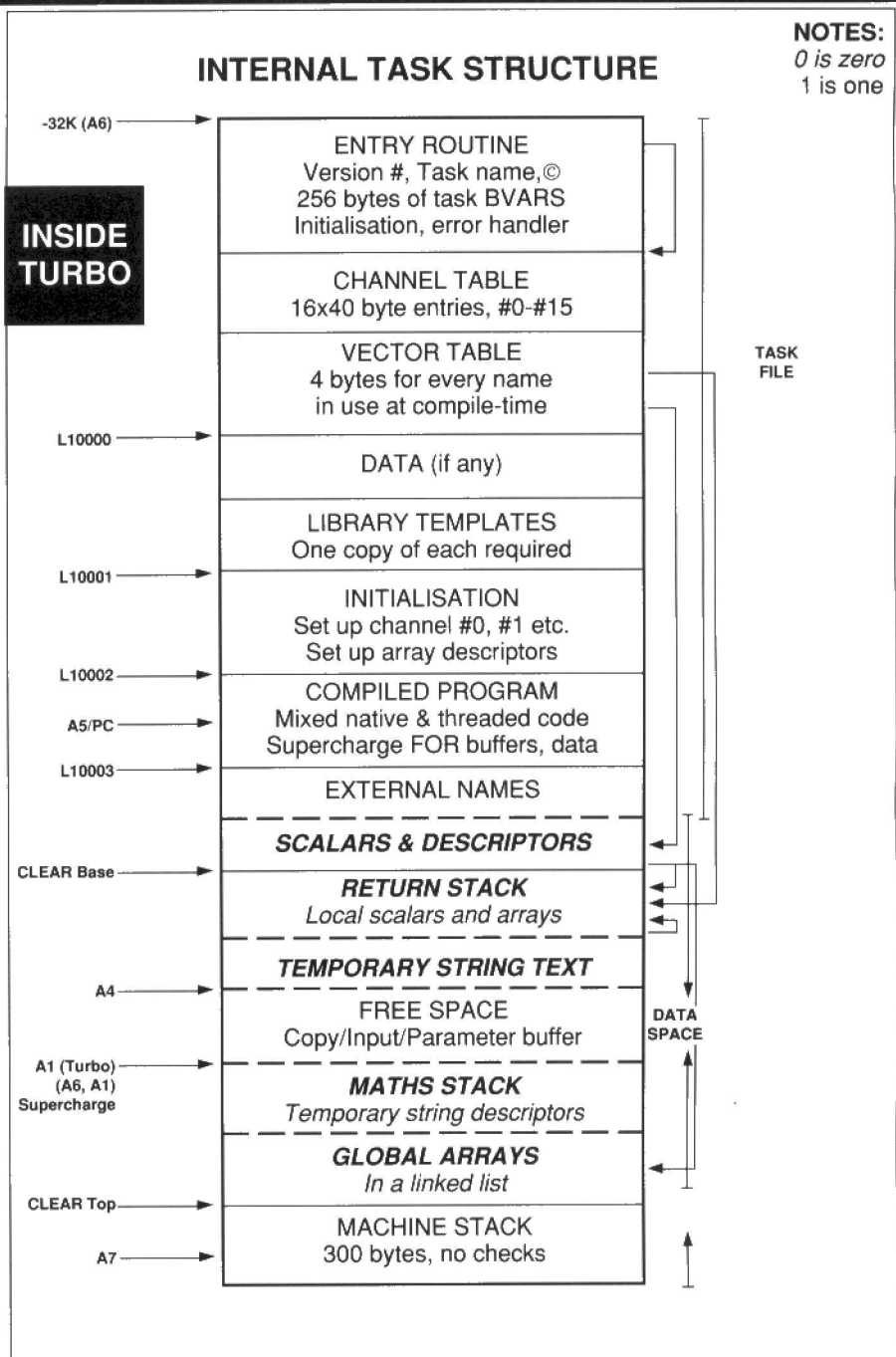
Compiled tasks start with **Entry Routine** and a standard sequence: branch instruction, version number, task name, copyright message and initialisation code. Turbo library version numbers are unrelated to the toolkit, codegen or parser vintage. They occupy bytes 3 to 6 of each task file.

The Turbo library reached final version 5.10 in July 1987. New features make better use of the code. Turbo 2 and 3 (May 1990) have corrections and small changes in the parser and toolkit. 3 requires expansion ram.

The remainder of Entry Routine holds code to find and link resident extensions, and routines needed by every task to report errors, set up tables and so on. 256 code bytes are cleared after use and used to mimic SuperBasic's BV pointers.

Turbo's Entry Routine is more than twice the size of Supercharge's, as it includes LINK_LOAD routines and some common subroutines. These bloat single-line tasks, but save space in the long run.

SuperBasic emulation demands a



Channel Table of 40 byte entries, so my designs reserve space for 16 channels after the Entry Routine. The space is fixed, allowing easy access to the **Vector Table** – the most important table inside a task.

The Vector Table is analogous to SuperBasic's Name Table, but has just 4 bytes for each name known when the program was compiled. Depending on the name type, vectors locate corresponding machine-code, descriptors or data values.

Entry Routine finds resident procedures and external variables, and sets their vectors. LOCAL instructions update the Vector Table to point to the new data; RETURN restores old addresses.

To see the tables inside Turbo tasks, load them into screen memory. If the task is less than 32K, LBYTES

FLP1_TASK,131072 will do the trick. Entry Routine comes first, followed by a narrow black band with diagonal white dashes, the Channel Table. The dashes indicate that each channel is initially closed. The wide black band is the Vector Table; vectors are initially zero. These areas are cleared after Supercharge tasks load.

Other areas are harder, but you should see the difference between library routines and threaded code. Ascii text is identifiable in video memory by the vertical striations caused by the 7-bit code, and groups of small and large letters.

When the Entry Routine has finished it jumps to a point immediately after the **Library Templates**. These are threaded code templates, and fetch parameters from the compiled program with MOVE (A5) + instructions, so that they have


```

* SuperBasic and equivalent Intermediate Code
* by Simon N Goodwin for QL World, June 1991.
*
* 100 PRINT "Factorial 9 is " & Factorial( 9 )
*
LINE100 LINE          100      Line number to D6
      CONSTANT_INT      1      Default is #1
      CHANNEL           Direct PRINT etc.
      CONSTANT_STRING   "Factorial 9 is "
      CONSTANT_FLOAT    9      Fetch parameter
      BASIC_FUNCTION    DEF17   Call Factorial
      FLOAT_TO_STRING
      CONCATENATE       Apply the '&'
      PRINT_STRING
      PRINT_SLASH

*
* 110 DEFINE FUNCTION Factorial( limit )
*
LINE110 LINE          110
      JUMP              SKIP17   Skip over DEFine
DEF17  LOCAL_FLOAT      385      Declare limit
      STORE_FLOAT       385      Initialise limit

*
* 120 IF x=1 THEN
*
LINE120 LINE          120
      FETCH_FLOAT       385      Stack limit
      CONSTANT_FLOAT    1

      EQUAL_FLOAT
      IF_FALSE          ELSE6    Compare values
                                Jump unless TRUE

* 130 RETURN 1
*
LINE130 LINE          130
      CONSTANT_FLOAT    1
      RETURN

* 140 ELSE RETURN limit * Factorial( limit - 1 )
*
LINE140 LINE          140
      JUMP              ENDIF6   This is redundant
                                Fetch limit
      FETCH_FLOAT       385      Fetch it again!
      CONSTANT_FLOAT    1
      SUBTRACT_FLOAT    DEF17   Apply '-'
      BASIC_FUNCTION    DEF17   Recursive call
      MULTIPLY_FLOAT
      RETURN              Apply '*'

*
* 150 END IF
* 160 END DEFINE Factorial

LINE150 LINE          150
      ENDIF6
LINE160 LINE          160
      SKIP17  PROG_END   Close the IF block
                                Stop gracefully

```

different effects depending on the initial value of register A5.

If the compiled program includes **Basic DATA** statements, the values come next. Supercharge distinguishes types by negating the first word of floating point numbers, giving values -1 to -4095. Strings start with a length, 0-32766, and -32000 marks the end of DATA. Integers need two words: +32767, then the value. The interpreter uses at least eight bytes for every DATA number.

Turbo exploits properties of the datatypes to reduce the need for separators. If the first word value is between 0 and 32766, string text is assumed to follow. Negative values to -4095 are negated floating point exponents, followed by four bytes of mantissa. Integers in the range -2998 to 25670 are stored as single words - negate and add 7096 to get the value - while less common integers take 4 bytes: 32767. W followed by the word value. -32767 marks the end of DATA.

So you can patch DATA with no need to re-compile the program. Use a unique string to mark the start of the data block you want to change. Load the compiled task into memory with LBYTES, POKE the data after the marker, and save the new version with SEXEC.

Use an end-marker and pre-allocate space for strings; don't alter the length, or the compiled code may get lost. Preset Turbo integer DATA to -4444, say, so you can patch any value -32768 to 32767 later. Chas Dillon has used this technique successfully for years.

The **Compiled Program** area contains in-line 68008 code, threaded template addresses, string constants, numbers, and Vector Table offsets used to find variables and code. Each RES-PROC or RES-FN template is followed by a string of parameter types and separators. Addresses are offset on A6, which normally points

32K past the start of the task, so signed 16 bit offsets cover a useful 64K. Turbo allows 32 bit addressing for tasks over 64K, but the vector table and library templates must fit in the first 64K; use no more than 12,000 names per module!

The **External Names** area is read when the task starts. It holds indices and names for Resident procedures, functions and variables outside the task. It comes right at the end of the task code, so its space can be re-used for data once the External Names are linked.

The internal task structure lets areas grow and shrink dynamically around the **Free Space**. Both compilers use A4 to address the lower limit; Supercharge finds the top with (A6, A1); Turbo uses A1.

Working outwards from the middle, each area is more persistent than the one before. When a compiled function is called, the Return details are stacked after the scalars and descriptors, leaving the Maths Stack free for parameters and the result.

Concatenation

The **Maths Stack** and string temporary area are busy during expression evaluation. The stack uses small word-aligned entries, for speed, while **Temporary String Text** is byte aligned, so that string sub-expressions are implicitly concatenated as they are stored. Temporary strings are tracked by six byte descriptors on the Maths Stack.

Once parameters have been evaluated, some remaining 'free space' is used to pass type details; as resident procedures and functions run the remaining space imitates the SuperBasic line buffer used by INPUT, EDLINE\$ and COPY.

The effect is that all the free memory is available for each data-structure. The only time that data has to move is when a global array is re-dimensioned, and other

arrays have taken up the space between the old array and the free space.

In this infrequent case the other arrays are moved to make room, and their **Descriptors** updated to point to the new locations. The Vector Table does not need alteration as it points to the Descriptors, which are fixed in place during threaded code **Initialisation**, between label 10001 and 10002.

In the library

The template library forms the majority of CODEGEN_TASK. It consists of hundreds of machine-code templates - one for each intermediate instruction.

Intermediate codes 1 to 999 cause the corresponding 68008 native code template to be written into the task file. The Intermediate code always starts with 999, Entry Routine.

Integer operands are mixed into the code; Entry Routine has a word parameter, the number of Vector Table entries. 139, DATA_FLOAT has three word parameters which make up the six-byte value. 170, CONSTANT_STRING is followed by a length word, and the text.

I have no room to list all the Supercharge or Turbo intermediate codes; a few examples gives the flavour. The listing shows a short but complete SuperBasic program interspersed with equivalent intermediate code instructions and labels.

Zip has an optimiser that replaces common sequences with faster code. A QLOPTIMISER_TASK could run between PARSER and CODEGEN, read the intermediate code and replace, remove or re-order code to save time or memory. Turbo threaded code is concise, especially if line-numbers are disabled, but the compiler can only take limited account of special cases.

Many intermediate instructions are de-

TURBO AND SUPERCHARGE

signed for special purposes but could have wide uses in an optimised program. Turbo instruction 359, `EXPR_SLICE_1D`, could be used to slice a literal string, or the result of a function, Minerva style. It expects a string and two integers on the stack, leaving a sliced string.

Incidentally, Turbo and Supercharge use the symbolic offset zero to refer to the default start or current end of a string, so `PRINT A$(3 TO), A$(3 TO 0)` writes the whole string twice from character 3, if compiled.

You could save time with instructions like `LOCK` and `UNLOCK` (361 and 362), which stop and start the Qdos scheduler, or `INCREMENT_FLOAT`, which adds one much faster than the sequence `CONSTANT_FLOAT 1: ADD_FLOAT`.

Intermediate Code 130, `PLUS_FLOAT`, generates nothing at all. It signifies Unary Plus, the difference between 32768 and +32768, and needs no code. It could pad out an optimised sequence.

Codes up to 999 identify native 68008 routines, used for in-line code. Add 1000 to get equivalent threaded code, so 1363 generates a threaded call to `INCREMENT_FLOAT`. Some instructions, like `ENTRY_ROUTINE` or `DATA_FLOAT`, have no threaded equivalent.

When CODEGEN finds a code between 1001 and 1381 it makes a note that the corresponding template is needed, and includes it, remembering the file offset, in

the template library written later. When the program code is generated CODEGEN stores the 16 bit offset of the address of the template, followed by its parameters.

One instance of the template is good for any number of threaded calls. Each call needs just two bytes, and works faster than the obvious `JSR` and `RTS` instructions.

As the threaded code runs, each template is found by a pair of instructions:

```
MOVE.W (A5)+,DO
JMP O(A6,DO.W)
```

The `MOVE` reads the offset of a library template from the compiled code, and updates A5 to point to the next offset, or perhaps parameter data. The `JMP` combines the offset with the task base address in A6, and jumps to the 68008 code there.

The code generator also lets you swap from threaded code to in-line execution, and back again, with special instructions. **REM+** marks a change from threaded code to native, and corresponds to the 68000 instruction `JMP (A5)`, intermediate code 254.

255 or **REM-** switches back to threaded code almost as fast. The 68008 sets A5 and uses the usual two instructions to pick up the next thread.

Threaded `JUMP` instructions change the value of A5, instead of PC. Depending on circumstances, Turbo can generate doz-

ens of different 'jump' instructions, customised to suit 16 or 32 bit addressing and the type of code before and after the jump. Supercharge addressing uses 16 bit A6 offsets.

Program variables are indirectly addressed via the Vector Table, so that `LOCAL` statements can change the association between a name and a storage location. Vectors are 32 bits wide, to allow gigabytes of data. Given instruction code 1141 (Threaded `FETCH_FLOAT`) Supercharge finds the variable X like this:

```
SUBQ.L 6,A1
MOVEA.L X_VECTOR(A6),A2
MOVE.W (A2)+,0(A1,A6.L)
MOVE.L (A2),2(A1,A6,L)
```

Most floating point operations are more complicated, so the time taken by the threading instructions is minimal compared with the space-saving.

Intermediate codes between 10000 and 65535 are 'labels', used to mark data and program statements. They are issued in a complicated pattern which means that the compilers can handle up to 12,000 blocks of code per task.

Supercharge intermediate code sparkles on the screen as the code generator runs, because parameters are converted as it goes along. Name Table indices and symbolic labels are replaced with A6 offsets.

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SOFTWARE FILE

INFORMATION

Program: Music Manager (V1.2)
Supplier: Ergon Development
 c/o Davide Santachiara, Via
 Emilio de Marchi n.2,
 42100 Reggio Emilia Italy. Tel.
 (+39) 0522 70409.
Price: £10 (£12 on MDV) + £5
 p+p.

MUSIC MANAGER

Bring a little music into your programs, and learn the notes at the same time, says Rich Mellor.

Very little software from the Italian scene reaches the UK market, though I hear there are quite a few active users in Italy. This is one of several programs released recently by this Italian software house.

This program would seem to fill a nice little niche in the QL software market. It enables the user to create musical masterpieces and convert them into a task which can play in the background of a game, for instance. Of course, it is somewhat limited by the QL's hardware, although the program does a good job of playing any notes entered into it (only one or two of the very high or very low notes seem off-key).

Protection

Loading the program presents little problem (once you have ensured that the boot contains a MODE4 command), as a boot program is included. After a few seconds, you are presented with a title screen, which gives some background to the program. Ergon seem to have used an odd method of copy protection. Not only is a user code embedded deep in the program, but also your name and address, which is displayed on screen.

Pressing a key takes you into the main area of the program. The layout is based on the Psion programs with information on keys to press above the main screen where entry of the music takes place. Entering music

is a little awkward, since instead of typing the notes straight onto a stave, you build a list of notes. Pressing the keys A-G (or 1-7) enters a note of the correct key. SHIFT plus 1-7 alters the value of the note (eg minim, crotchet). There are also keys to alter the octave (five octaves are supported), to add sharps or flats, make a note

into a triplet or add a dot to the note. Rests can be included in the list of notes by pressing 0 and using SHIFT 1-7 to alter the length of the rest.

Apostrophe

All the possible musical notes are supported fully, although

if there are two similar notes, the computer tends to merge them together into one continuous note (adding an apostrophe to a note will prevent this). Once you get used to the method of entry, it soon becomes straightforward and is actually easier to use than entering the notes directly onto the stave.

MOVING Press ↑ ↓	NOTE premi : A+G, 1÷7 #+, b- F5 fuzzy 0 rest ENTER to insert	DURATION press : SHIFT & num. 1÷7 ◊ • ♪ ♫ ♬ ♧ . ♩ ♪ ♫ ♬ ♧ DOT	CHANGE OCTAVE Press : F4 to ↑ octave SHIFT & F4 to ↓	COMMANDS Press F3 ESCape Press ESC
1)	SI	1/16 ♪	OCT 3	
2)	LA	1/16 ♪	OCT 3	
3)	SOL #	1/16 ♪	OCT 3	
4)	LA	1/16 ♪	OCT 3	
5)	DO	1/8 ♪	OCT 4	
6)	PAUSA	1/8 ♪	OCT 3	
7)	RE	1/16 ♪	OCT 4	
8)	DO	1/16 ♪	OCT 4	
9)	SI	1/16 ♪	OCT 3	
10)	DO	1/16 ♪	OCT 4	
11)	MI	1/8 ♪	OCT 4	
12)	PAUSA	1/8 ♪	OCT 4	
13)	FA	1/16 ♪	OCT 4	
14)	MI	1/16 ♪	OCT 4	
15)	RE #	1/16 ♪	OCT 4	
16)	MI	1/16 ♪	OCT 4	

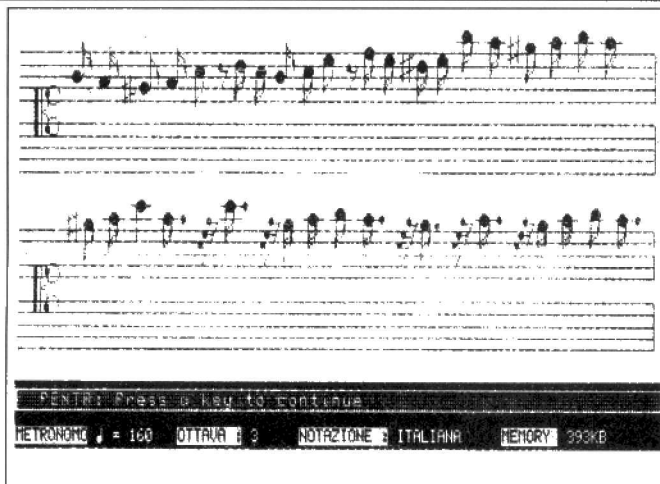
EDIT mode :
 METRONOME ↓ = 160 OTTAVA : 3 NOTAZIONE : ITALIANA MEMORIA 393KB

Music Manager – the editing screen.

Pressing F3 enters the command mode. Here are all of the usual file handling commands (load, save, format, view (performs a Directory), kill a file, and backup), together with commands to merge two compositions, alter the speed of playing music, zap the current composition and Quit the program. Oddly enough, the command to go to a certain note is also included here; it would certainly have been better in the Edit mode.

Masterpiece

You can also alter the notation for the different notes, choosing between English, French or Italian notation. Once you believe you have created a masterpiece, all or part of it may be played, and then printed on a stave, so that you could use this program to learn how to write music in a more traditional format. Oddly enough, there is no option to play the music as it is being printed on the stave, nor to output the Stave to a printer (there is a command to dump



Music Manager – the music on a conventional stave.

the music to the printer, but this only prints the notes as they appear in the edit mode). Pity!

The most exciting part of the program is its ability to create a small task which can be loaded into the computer at a later date and will play your musical masterpiece in the background of most other programs - although this is probably only most useful in your own programs, since in this current version there is no ability to

make a composition repeat continuously. The creation of this file is very simple, (enter the command task), and provided that the *MusicManager* disk is in flp1, the file will be created. The manual then gives a very clear example of how to load the file and make it play in the background of a program.

As a whole the program appears to be very professionally produced (although there is still a little Italian here and there which needs to be altered), and

I certainly did not experience any problems in using it. There are various sample musical compositions included on the disk which vary in quality, but do show what can be achieved with the program.

Useful

If you want to produce something of a semblance of music on the QL, then this is a useful package. Even with the QL's limited capability to produce notes out of its speaker, this program goes a long way to helping provide a simple way to introduce music to new games.

When sending for the program, cheques must be made out to D. Santiachiara. Please note that you must add a £4 conversion fee if the cheque is made out in sterling. This may seem a little expensive, but if you send a Eurocheque in Lire, the cheque fee is only £1. Also, there are discounts if you buy more than one program from the software house, and of course the cheque conversion costs will only apply once for each cheque.

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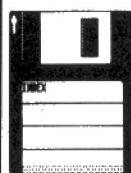
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